

Back to Earth

Adobe Building in Saudi Arabia

Second Edition

Foreword: HRH The Prince of Wales

Edited and Revised:

HRH Prince Sulṭān bin Salmān bin ‘Abd al-‘Azīz Āl Sa‘ūd

By: William Facey

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CLARENCE HOUSE

For centuries the mud brick architecture of Al Diriyah in Riyadh has stood as a landmark of the built heritage of the region of Najd. Bold and majestic in its form, it expresses with a simple elegance the character of the people who built and inhabited it as well as their response to the challenging environment which confronted them.

Sadly, starting in the 1970s and the first oil boom in Saudi Arabia, this architecture has witnessed a long period of decline and decay. This period was defined by a massive wave of construction which rejected the mud brick architecture of the traditional built environment and instead turned towards the new cities of concrete, steel and glass that symbolized the new aspirations of the country and the time.

Enough time has now passed since this first construction boom for us to assess the reality that this new architecture has brought to our lives. We have discovered that the comforts of modern life are often bought at a high and unsustainable price; a price that includes living in environments that inadvertently devalue our true human nature and, along with it, Nature herself.

The consequences of the loss of the traditional architecture of Saudi Arabia were recognized at an early stage by His Royal Highness Prince Sultan bin Salman who, as Head of the Saudi Commission for Tourism and Antiquities, has embarked on an extensive programme of preservation and regeneration – with the aim of not only re-introducing to a new generation of Saudis this built heritage as a relevant and contemporary architecture, but also demonstrating that it is perfectly possible to combine modern technological convenience with a living timeless architectural tradition.

Yet Prince Sultan went beyond public policy and programmes by engaging with this architecture in a more direct and personal manner. He chose to bring back to life the Al Outheibat farm with its mud brick farmhouses and make it his home – a home which I remember visiting some twenty years ago and then, again, during my trip to Saudi Arabia in February 2014.

This project has been a labour of love and dedication by Prince Sultan over the last twenty years. Each aspect of the farm has been meticulously considered and sensitively brought back to life. Yet this endeavour extends beyond just the consideration of the buildings themselves and has always set the objective of creating a context that integrates these buildings into the realm of the wadi which carves a lush oasis in the harsh desert – from the palm groves that provide a natural canopy of shade to the use of natural wind towers to cool the air within the buildings, so that one experiences how the elements of the natural environment work harmoniously with the buildings.

This project has also been one of education through a research environment on the farm that has brought together traditional builders with architects and engineers in order to find contemporary outlets for this timeless way of building. Hence this initiative was not limited simply to bringing the old buildings back to life, but extended to designing and building new ones to suit the evolving needs of living on this site. During the last twenty years, I have observed with mounting admiration the noble efforts of Prince Sultan to remind his countrymen of the long-term value of a harmonious blending of the best of the ancient and the best of the modern.

The old and the new now sit together as a harmonious whole and an expression of a tradition that found its roots in the earth of Diriyah and is now moving forward as a model that is increasingly being replicated as a means of contemporary and sustainable living.



Introduction

*It is Allah Who made your habitations homes of rest
and quiet for you.*

*The Holy Qur'ān, Sūrat al-Nahl
(“The Bees”) verse 80*

Opposite Prince Sulṭān bin Salmān discusses the finer points of door design at al-‘Udhibāt with ‘Abdullah bin Hāmīd the master-builder (1995). Prince Sulṭān maintained a close personal interest throughout the project, involving himself in every aspect of decision-making.



As I look back, the seemingly modest project of rebuilding the house at the al-Udhaibāt farm in al-Diriyyah has been an inspiring and profound learning and living experience, and has, in so many ways, enhanced my life and changed it for the better.

From this simple and novel idea in 1992, I have embarked on a life's calling to save and rehabilitate the national heritage of my country, and to educate its citizens about the importance of preserving it for future generations. The mud house at al-Udhaibāt, which is the subject of this book, has played an important role in setting off the astounding transformations that we are

experiencing today in Saudi Arabia's national heritage.

Spurred by the success of the experiment of rehabilitating this historic house, I spent the past few years crisscrossing my country, traveling to towns and villages, diligently working with local officials and communities to promote the values of our national heritage as an integral part of the nation's social and economic development, and as the link for the young generations to our national identity, great history, and cherished values.

As a means to focus my keen interest in preserving and promoting our national heritage, I

Opposit King 'Abd al-'Azīz and the people of Riyadh perform the '*ardāh*', the traditional national war performance, in the old mud-built centre of Riyadh in 1937. This picture, published in the *Illustrated London News* of 2 April 1938, was one of the picture sent to the magazine by Violet Dickson who, with her husband Harold, was in Riyadh at the time as a guest of the King.



King 'Abd al-'Azīz on the roof of the Murabba' Palace with nineteen of his sons. In Riyadh 1946. From left to right: Princes Turki, Badr, Mishārī, Mit'āb, 'Abd al-Rahmān, Mish'al, Salmān, Fawwāz, Maṣhour, Mamdūh, 'Abd al-Ilāh, Sa'ūd, Thamer, Saṭṭām, Fahad, Mājīd, Nā'if, Nawwāf and Ṭalāl.





decided in 1996 to create the Al-Turath Heritage Foundation. The early work undertaken by Al-Turath, proved to be a solid base on which to build. Al-Turath has since accomplished a vast number of heritage initiatives and projects, ranging from publishing, education, promotion to preservation, and restoration. In addition, Al-Turath has established the National Heritage Award for students, professionals, builders, and communities, to boost and stimulate the sense of heritage throughout the Kingdom of Saudi Arabia and by 2013 the award expanded geographically to include the Cooperation Council for the Arab countries of the Gulf (GCC). www.al-turath.com

These efforts have helped bring into focus the crucial issues of our national heritage and

galvanized the support of many partners who made possible much of Al-Turath's accomplishments.

On a larger scale, I was fortunate to be the Founding President and later Chairman of the Saudi Commission for Tourism and Antiquities (SCTA) in 2001. www.scth.gov.sa

I was keen from the beginning that SCTA must become involved in the national heritage agenda.

By 2005, our first national development plan for tourism was approved by the government, with a top priority being the Kingdom's heritage.

Since then, the Commission and its partners have joined forces to focus on the Kingdom's built

HRH Prince Salmān bin 'Abd al-'Azīz Āl Sa'ūd and HRH Prince Sulṭān bin Salmān bin 'Abd al-'Azīz Āl Sa'ūd at al Ghat 2009

**HRH Prince Sulṭān bin Salmān
with French President Jacques
Chirac during his visit to al-
‘Udhaibāt.**



**Master-builder ‘Abdullah bin
Ḥāmid working on the interior
motives during the rebuilding.**





First visit to al-‘Udhaibāt mud house by HRH the Prince of Wales at 1997 with (from right to left) my late brother Prince Fahd bin Salmān and his sons Sulṭān and Aḥmad, and my son Salmān.

heritage becoming a part of the national, urban, economic, social and cultural development.

The SCTA also began inscribing heritage sites to the UNESCO World Heritage List, such as Diriyah, the historic capital of the Kingdom of Saudi Arabia. As part of a deliberate and organized effort to bring know-how and heritage awareness to the public, the SCTA supports local communities by providing technical expertise and funding, and organizes field trips for municipal and town officials to urban heritage sites around the world. In addition, the Commission has provided heritage educational programs to schools and coordinates regular conferences and National Built Heritage Conventions, which are held annually in different regions of Saudi Arabia.

The National Built Heritage Center was also founded in 2011. www.nbhf.org.sa

The year 2014 marked a historic turning point for the Kingdom with the approval of the Custodian of the Two Holy Mosques Initiative for Cultural Heritage.

In 2015, SCTA was re-named the Saudi Commission for Tourism and National Heritage (SCTH). Indeed, this was a national historic moment for me and to the whole nation.

In 1997, I wrote in the foreword to the first edition of *Back to Earth* “...in the spirit of this tradition al-Udhaibāt house was originally built and restored, the continuous evolution principle is the main issue we tried to emphasize, and never



Master builder ‘Abdullah bin Ḥāmid with Eng. Kubilay M. Ali working on the interior design during the rebuilding .

Historic Atturaif in al-dir‘iyyah.





Wadi Ḥanīfa.



Master-builder ‘Abdullah bin Ḥāmid working on the interior design carvings during the rebuilding.



HRH Prince Charles with (from right to left), HE the late Dr. Gazi Al-Qusaibi (KSA Ambassador to UK at the time), Prince Saṭṭām bin ‘Abd al-‘Azīz the late Governor of Riyadh, Prof. ‘Abd Al-Wāḥid Al-Wakīl, Prince Mit‘ab bin Abdallah, and Prince Sulṭān bin Salmān, at al-‘Udhaibāt in 1997.

attempted to impose solutions that are meant to be final or unalterable.”

Al-Udhaibāt has continued to evolve and adapt to the demands of modern living while being firmly rooted in the heritage of the past and the environment of place.

Much has been accomplished since the first edition some 18 years ago, and credit should go to those who believed in the importance of our national heritage, especially the partners across the Kingdom and elsewhere. They are proof of what I proposed in the foreword to the first edition of the book: “... that the more educated and enlightened a community becomes, the more it will care for its heritage.”

We have still a long way to go, but in this future journey I am joined with so many others who believe in the heritage of our great country.

HRH Prince Sulṭān bin Salmān bin Abd al-Azīzāl Saūd

Al-Udhaibāt 2015

*Chairman and President of the Saudi Commission for Tourism and National Heritage
Founder and President of Al-Turath Foundation
Founder of the National Built Heritage Center
Founding Member of the Saudi Heritage Society*

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HRH Prince Charles with HRH Prince Sultān bin Salmān at the main gate of al-‘Udhaibāt, 2014.

HRH Prince Sultān bin Salmān with Dr. ‘Adel Fahmi checking a new mud brick sample for the new expansion in al-‘Udhaibāt, 2010.

HRH Prince Sulṭān bin Salmān on a visit to Al-Bojairi quarter project in 1997, (to his right) Arch. Sāmī Al-Jubāir and Arch. ‘Alī Al-Shū‘aibī, (to his left) Dr. Mansūr Al-Jadīd and Dr. Yusuf Fādān; The project was initiated by Al-Turath foundation and supported by RDA, aiming to develop architectural heritage educational programs in Saudi universities.



Master builder ‘Abdullah bin Hāmīd with Arch. ‘Abdullah Al-Dughaiṭher (right) during early days of the rebuilding.





Students on their summer field training in al-dir'iyyah in 2012, part of the joint training program between KSU, RDA and SCTA.

Reflections

Prof. ‘Abd al-Wāḥid al-Wakīl

Through my readings on ancient civilizations and having experienced recent vernacular practices in architecture, I came to realize that, in order to succeed, any new direction in architecture to be accepted by the less affluent, has to come from the elite. For a new direction in architecture to flourish in any society, the example has to be set by the ruling class and by the aristocrats and the well-to-do; by imitation, people will accept the new form and new style.

In philosophical terms: for a new direction in architecture to succeed, it should filter from top to bottom, from the rulers to the elite, to the general public, and finally to the less well-off.

This is the case in most high ancient civilizations, such as the Egyptian. If this process of percolation is not followed, the style is doomed to failure, as in the case of Hassan Fathy’s proposals for Al Gournā village, which was wrongly labeled “architecture for the poor,” inverting the process from bottom to top.

In Muslim society, creativity is always related to the Creator God Almighty, while in some other societies it may be related to man, to the artist’s whims, and egoism. The best examples of God’s creativity are in nature. It is in nature that we can find the order of creativity. Following the natural order of creation is in a way an act of worship, namely the glorification of God Almighty to whom we pray daily, a main pillar of Islam. Using natural building materials, such as adobe, or any architectural concept related to nature and its order, will bring into harmony the man-made environment with the natural.

Conversely, in some societies conquering nature is the aim, to the degree that the end product is a depletion of the natural environment by creating systems that are anti-nature under the guise of modernization. These systems can be compared with the monsters created by filmmakers, who in the end turn against man and nature.

As successful styles of architecture should be filtered from the top (the ruling class) down to the less affluent, a successful design should



**Prof. ‘Abd al-Wāḥid al-Wakīl
with the master-builder
‘Abdullah bin Ḥāmid**

come from a design in harmony with nature.

I found the invitation of HRH Princess Sulṭān Bin Salmān, which I received while in London in the mid 80's, to build his Riyadh house, to be a great opportunity for my practice.

Prince Sulṭān, of the Saudi royal family, is a well known figure in heritage preservation. He is also an astronaut and a pilot, who had been exposed to the state of the art in space technology and to the most advanced equipment and materials. The Prince also appreciated nature, not only from the vantage of outer space, but also from the Earth's surface, as he returned back to Earth. For him, it was not only back to Earth, but also back to building with earth, with mud, and with adobe.

It was a good start for this project, especially when Dr. Sāliḥ Lam'ī, an experienced building restoration specialist, came on board. This was a beginning of a journey whose destination was the design of the house. However, the journey took a different route: it was the route of self-discovery, the discovery of local Saudi culture, as well as world cultures. Many world historical sites were visited with HRH Prince Sulṭān Bin Salmān to take a closer look at the essence of their development.

So, in a sense, Prince Sulṭān is also back to Earth by returning to the heritage of his ancestors in building his house in Al 'Udhaibāt with adobe, a long-established tradition of building in the Arabian Peninsula.

The old farmhouse and the beautiful water-well that existed on the property were the basic elements around which other parts of the project were distributed.

Publication of Back to Earth will give hope to architectural directions that have failed to reach the masses, because the proposed direction is architecture for the rich, not "architecture for the poor", and is nature-friendly, not anti-nature.



HRH Prince Sulṭān bin Salmān bin 'Abd al-'Azīz Āl Sa'ūd with Prof. 'Abd al-Wāḥid al-Wakīl on site during rebuilding.



Prof. 'Abd al-Wāḥid al-Wakīl with Dr. Sāliḥ Lam'ī during site inspection; winter 1995



Prof. 'Abd al-Wāḥid al-Wakīl checking the wall alignment during the rebuilding.

The Project

Prof. Sāliḥ Lam‘ī

I had the pleasure to work with His Royal Highness Prince Sulṭān bin Salmān — to whom I had been introduced by Architect Abdel-Wahed El-Wakeel on the rehabilitation of the adobe building at the palm plantation, al‘Udhaibāt, and I especially appreciated his interest in urban planning, architectural heritage in general, and earthen structures in particular.

After I presented the work concept in this project to preserve values of design, building material, handicraft and setting, in line with the distinct, authentic character of the Najdi style in Saudi Arabia, Prince Sulṭān gave me his generous support to proceed.

It was a tremendous cooperation between the craftsmanship based on field experience of the local traditional builder Abdallah Bin Hāmed, and technical practices of engineering and science. All this took place under the continuous supervision of His Royal Highness, his constant support and encouragement, and with the help of all involved.

This project was an example of adapting and developing an adobe structure to perform integrated functions compatible with contemporary living requirements, stressing the link with rich Najdi architecture, and traditional construction.



Dr. Sāliḥ Lam‘ī with the master-builder ‘Abdullah bin Ḥāmid on site during rebuilding; winter 1995.



Dr. Sāleḥ Lam'ī and the late photographer Salāḥ Al-'Azzaz and master Calligrapher Dr. Aḥmed Mustāfa, on site during rebuilding; winter 1995.

The building was completed during the year 1994 C.E.

It was a unique experience reflecting the hybrid between cultural heritage and a contemporary way of life, valuable to present and future generations by ensuring continuity between the past and the present, not only for the benefit of Saudi society, but also for the society in the Arab World.

This rich experience has been adopted and developed in many buildings in Saudi Arabia, and will now be taken forward to new dimension in the new addition being built by Prince Sulṭān in al-'Udhaibāt. I am indeed privileged to again be a part of this new experience with Prince Sulṭān.



Dr. Sāliḥ Lam'ī in al-'Udhibāt, 1995.

Following page al-'Udhibāt





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*This Book is dedicated to the Najdi master-builders
of the past, present and future.*



1

Mud and Modernity

According to Qais bin Talaq, his father said: “I came to the Prophet (peace be upon him) while he and the Companions were building the Mosque, and I found the way they were working unsatisfactory. So I took up a spade and with it mixed the clay [ṭīn]. My work seemed to arouse the Prophet’s (PBUH) admiration, for he said: “Let the Ḥanafī work with the clay, because he is the most skilful of you with it.”

A Tradition (*Ḥadīth*) of the Prophet Muḥammad, (PBUH) recorded in the *Musnad Ahmed*. The Banī Ḥanīfah, the settled tribe of the Wadi Ḥanīfah region of Najd, was already well-known for their mud-building skills in the early 7th century AD, at the time of the Revelation of Islam.

Opposite The charming view across the courtyard towards the southern ruwaq outside the dīwāniyyah.



Building on tradition

Take 1 cubic metre of wadi clay, 50 kilograms of chopped straw and 1 to 1.5 cubic metres of water. Mix well and leave to ferment for up to three weeks, keeping moist. Scatter some straw on a flat place, and pack a wooden mould with the mixture. Remove the mould and repeat several hundred times, in rows. Leave in the sun to dry thoroughly.

It is simpler than a recipe for making bread: the sun is the only cooker required. But the domestic analogy is exact: any and every household in Najd "the traditional name for central Arabia" was able to perform this task, though it was usually a team effort carried out with advice and help from the neighbours, some of whom had special skills in, for example, making the right mud mix, woodwork, plastering or carving formal patterns in gypsum. This help was freely given, on the communal assumption that the favour would be returned at some time. As the Egyptian architect Hasan Fathy once

observed, "a house is essentially a communal production: one man cannot build one house, but a hundred men can easily build a hundred houses."

The materials too were freely available and could be obtained, with a little local knowledge, from the garden or the wadi bed. Simpler still, the alluvial deposits in the wadis of central Arabia are composed largely of adhesive clay, with just the right mix of silt and sand required to give it body and compression strength, and to help prevent cracking when dry.

Anyone can do it and it was traditionally available for nothing: one might say that unbaked earth is the ideal do-it-yourself building material. To build your house, you need no architect or specialist suppliers. But more than that, it is also the most democratic and flexible of

Opposite Sun-dried adobes are stacked ready for use, with plenty of air circulating so that they can continue to dry out.

building materials. In our age of state and private ownership, many of the essentials of life which were once regarded as owned by the community as a whole, and freely available for the common good, now have to be paid for. Good building earth, however, because it is not in demand as a commodity in itself, has so far remained outside the ever-widening grasp of ownership.

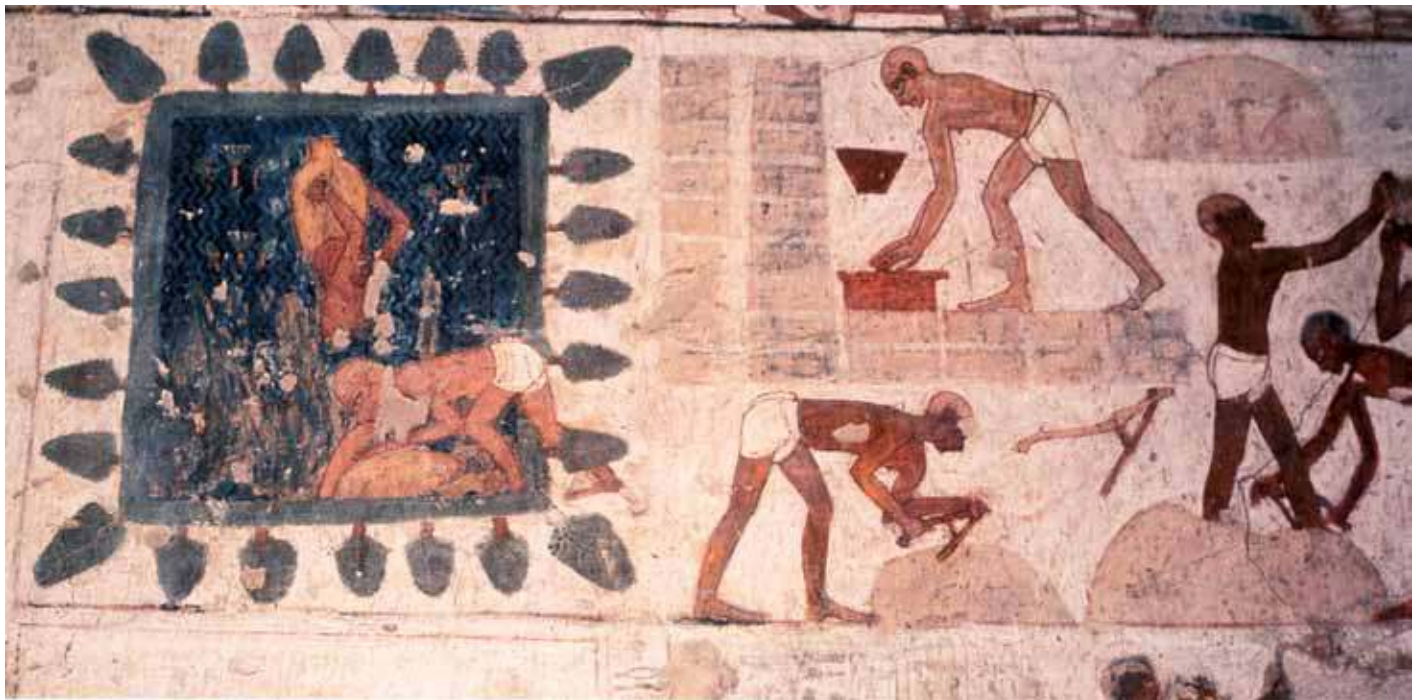
This is furthered by its sheer availability: there is potentially so much of it that it would be futile to attempt to control all the sources of supply. It has been estimated that the clays and adhesive soils suitable for building use make up almost three-quarters of the Earth's crust. It might be available on one's own land, for example, or, if not, then in the wadi bed where it is available to all.

So it is not surprising that unbaked earth is, together with rough stone and wood, one of mankind's oldest building materials. For as long as people have been settled, sun-dried mud

has provided them with shelter. Archaeologists generally agree that people settled permanently when they first domesticated animals and plants to become farmers. This leap forward in human affairs, sometimes known as the "Neolithic Revolution" traces its earliest known origins to the Middle East – more specifically the Fertile Crescent, Persia and Anatolia – around 10,000 years ago. With settlement there came villages, towns and, with time, cities, with all the burgeoning craft and trade specializations which that process entailed – in short, what we have come to term civilization.

On every continent, man built many of his earliest dwellings in raw earth, raising everything from crude huts to complex early settlements. Neolithic towns such as Jericho in Palestine and Çatalhöyük in Anatolia; most of the cities and villages of ancient Egypt from as far back as pre-Dynastic times more than 5,000 years ago; great Bronze Age cities elsewhere such as Ur and Babylon in the fertile crescent and Mesopotamia, Mohenjo-Daro and Harappa

Opposite Adobe-making and building have changed little in 3,500 years; in this wall-painting in the tomb of Rekhmirē' at Thebes (Egypt c.15th century BC), two men fetch water in jars from a pool, one tramples the mud, while another fills a wooden brick-mould, adding to the rows of drying bricks. The drawing shows the whole scene, from adobe-making to building.



Left The Egyptian hieroglyph *ḏbt* meaning "brick". It has passed via Coptic τωωβε into Arabic as *al-ṭūb*, from which the word adobe (sun-dried mud brick) has passed into English via Spanish.



The adobes for rebuilding al-'Udhaibāt were made in the old-fashioned way, but with modern standards of quality control.

in Pakistan; Chan-chan in Peru; and many of the religious monuments which went with them such as the ziggurats of Iraq, and some of the pyramids and other funerary monuments of Egypt—all were raised in unbaked earth. Even the Great Wall of China is only faced with stone for sections of its length: much of it is of unbaked earth, and its entire core is earthen. It is worth mentioning that some workers from these regions mainly Pakistan, Egypt, Anatolia and Yemen participated in the rebuilding of al-'Udhaibāt house as shown in some photos in this book.

Over thousands of years an enormous repertoire of building forms and local knowledge of materials grew up around the world, and most especially in the arid lands. Mud has been used for everything from simple rural housing to the most grandiose architectural expression of religion and power. Of all building materials it has been perhaps the most ubiquitous, and yet its decline has been sudden. In the modern world

it has had its champions such as the French architect François Cointeraux during the Industrial Revolution, Clough Williams-Ellis in Britain after the First World War, and Hasan Fathy in recent times, all of them visionaries of great influence. But it has been industrially processed building materials—baked brick from early times and, latterly, concrete, steel and glass—which have eroded the role of earth architecture. Today earth building has come to be identified only with poor rural communities. Despite the fact that it houses about one-third of the world's population, it is regarded as backward and primitive, not something to be proud of. It has become a building material of last resort, scarcely preferred to the corrugated iron and packing cases of the shanty town.

But that is because, as earth buildings have lost their status, so the techniques of good earth construction are being lost too. Its low cost and simple techniques can be turned to spectacular advantage. Fathy saw this very clearly, and

devoted his life to promoting earth building as part of the answer to rural poverty and bad housing in the arid lands.

What may be valid for the rural poor in much of the world's arid zone is less obviously so in more developed countries like Saudi Arabia, which can afford the most up-to-date solutions in alleviating social hardship. Why, then, do we have a project to revive Najdi mud building now?

Saudi Arabia is a young state, but it has come a long way in remarkably short time. Forged by 'Abd al-'Azīz bin 'Abd al-Raḥmān Āl Sa'ūd (known in the West more familiarly as Ibn Sa'ūd) during a series of campaigns from Riyadh between 1902 and 1926, its formal declaration in 1932 as the Kingdom of Saudi Arabia came just in time for the oil discoveries of the later 1930s. Since the Second World War, and most particularly since the oil price rises of the 1970s, Saudi Arabians have had to adapt to change at a rate rivaled in mankind's experience only by some of the other Gulf States.

In 1951 the first railway train pulled into Riyadh station—a sensational event which was attended by much celebration. The railway was the capital's first direct, fixed link with the coast at Dammam. Immediately it became possible for the first time to haul bulk quantities of the new, imported building materials—cement and steel—into central Arabia. Revolutionary though it was in terms of the capital's modernization, that day sounded the death knell for an ancient tradition of building and the collective skills stored in it over the millennia. At a stroke construction methods in Riyadh were internationalized, as the first non-Najdi-style buildings were erected. The first palace complex at al-Nāṣiriyyah, completed in 1953, is thought to be the earliest collection of buildings in Riyadh in modern materials and style.

A view of Al-Safat square in the city center to the left is Qasar Al-Dhiyafah while the place of Amir Muhammad bin Adbul Rahman stands at the entrance to Thumairi Street. Husn Al-Masmak can be seen in the background.
T.F. Walters, 1949 /50.



Al-Murabba' Palace in the 1940s: this new palace complex embodied King 'Abd al-'Azīz's ambitious vision of a Najdi architecture adapted to the purpose of modern government. It was characteristic of government building projects in adobe during the period of modernization before the 1950s, when concrete was first introduced into Najd.



With post-War revenues from oil increasing year by year, Riyadh's development in the 1950s accelerated accordingly. But its earlier expansion in fact dated from the prewar years of King 'Abd al-'Azīz's reign, some time before. Modernisation had begun in the early 1920s, with the introduction of the first motor vehicles and wireless telegraphy, and Riyadh began to expand outside its old mud walls, which had enclosed a town barely a kilometer across. This expansion accelerated as the population of the capital grew until, in 1936, the King decided to construct a new palace and seat of government to the north of the old city. Completed in 1938, this vast new walled complex, called Qaṣr al-Murabba' (Murabba' Palace), was built entirely of adobe and mud plaster. It represented the last large-scale attempt to adapt mud architecture to the requirements of modernization. A magnificent achievement by its builders, and carried out with a vision and panache not seen in Najdi building perhaps since the glory days of ad-Dir'iyyah in the late 18th and early 19th centuries, it also turned out to be the swan song of Najdi architecture. With stagnation during the Second World War and the arrival of the railway in 1951, the old building methods were to be relegated, as elsewhere in the developing world, to the countryside. From then on, the indigenous tradition of earth architecture was seen as an expression of backwardness.

***Opposite* The Corniche Mosque in Jiddah, designed by 'Abd Al-Wāḥid Al-Wakīl who, in drawing inspiration from Mamluk architecture, uses only baked brick to achieve imposing structural and spatial effects. He champions the virtues of craftsmanship in creating buildings which combine tradition with modernity.**

Since then, and especially since the oil price rises of the 1970s, Saudi Arabia has undergone a transformation which, in material terms, amounts almost to a complete break with the past. With the interesting exceptions of the rigid dress code, formal meals, and some aspects of the arts such as music and dancing, the material traditions of the past have been either discarded or greatly diluted. This is perfectly understandable when one considers the hardships entailed by the old way of life. But in





The Naşif Villa at Jiddah, designed by Hassan Fathy and built using the traditional coral blocks of the Red Sea coast.



The Qiblatain Mosque at Madinah, designed by ‘Abd Al-Wāhid Al-Wakīl.

many cases little consideration was given to whether or not the viable was being thrown out with the obsolete.

The rejection has not been wholesale, for at such times the past can provide an anchor, and some nonmaterial traditions, such as religious and family values, have survived and in some cases have even been strengthened, Saudis in particular have clung to these traditions as a source of pride, strength and reassurance in a changing world. This shows as much in their private lives—personal piety, the rules of hospitality and the sanctity of the family are all expressions of it—as in the comprehensive social welfare policies which the government regards as part of its Islamic obligations.

But the reasons for their rejection of the old architecture seem clear enough. Unlike their religion, family values and dress, which they are determined to preserve in the modern world as essential to their identity, Saudis have instinctively felt their building traditions to be indelibly tainted with the material poverty of the past. This generation has abandoned the privations of its fathers and embraced materialism and modernity with some understandable glee, and with little thought as to what it might lose along the way. Along with the loss of adobe went the loss of an architectural style. There was no time of experiments to find out the extent to which mud buildings could be adapted to modern amenities, or to adapt the old style to new materials in a way that transcended pastiche. The rebuilding of al-‘Udhaibāt Farm is an experiment conducted to explore just what are the potentials and limitations, in the case of the vernacular building tradition of Najd, both of traditional materials and a style of architecture. It is an experiment conceived and conducted by a man who epitomizes the modern Saudi

Arabia. Prince Sulṭān bin Salmān bin ‘Abd al-‘Azīz is rooted in the soil of Najd and in the history of his family, the House of Sa‘ūd, which ruled at ad-Dir‘iyyah from the 15th century and has ruled at Riyadh since 1824. Yet he is also the first Arab and the first Muslim to have ventured into space. He embraces technology, yet he feels deeply the threat to those long-held traditions, whether spiritual or material, which can justify their place in the modern world. He has a special interest in architecture, and indeed is Honorary Chairman of the ‘Umrān Society, Saudi Arabia’s leading forum for architects and planners.

Prince Sulṭān is concerned to promote vernacular architecture and the rich traditions associated with it. He argues that the qualities of the Najdi adobe tradition discussed above need to be appraised for a new role in the modern world. That mud and the skills to use it can be easily acquired at little or no cost, that it minimizes the need for architects and specialized industrial processes, and that it is a democratic material which could put control of their housing back into the hands of the people who most need it—these may all be qualities worth keeping in view. Technically, with its low cost and high thermal inertia, it may be better suited than modern, industrially produced materials, to the demands of living in the arid belt of the world—a vast zone which stretches from Central and South America, taking in North Africa, the Arabian Peninsula and much of the rest of the Middle East, to Iran, Pakistan, India, Afghanistan and China. It is estimated that arid and semi-arid zones account for 36 per cent of the Earth’s total land area.

There is also a profound cultural purpose. In losing their architectural styles and building methods, people lose an essential part of their cultural identity. Saudi have retained their



HRH. Prince Ahmed Bin Salmān Mosque, built by Al-Turath in Riyadh, in 2010, using adobe only.



Al Maddi Mosque in Riyadh using adobe only.



Al-Aushizah Mosque in Al-Ghatt using adobe only.



Al Duaihra Mosque in al-dir‘iyyah

traditional dress and adapted it to the modern world; why should they not do the same with their architecture? A true revival of building traditions has to go beyond the pastiche veneer of folkloric motifs on otherwise anonymous modern buildings that one so often sees. Traditional building forms have to be expressed in traditional materials. But the pedantic reinstatement of an old-fashioned material for its own sake, or the resurrection of a tradition merely as an act of cultural reassertion, are doomed to failure if they are done with no regard for practicability or acceptability in our modern world. Al-‘Udhaibāt Farm is not an exercise in cultural nostalgia. The aim is to give traditional techniques a chance to prove themselves, and to initiate a movement to improve the old techniques where necessary. The experiment is designed to test how far adobe is adaptable to modern use in Najd and, if it is not, to point out those aspects of it which can be improved upon.



Above Massed modern buildings in Riyadh’s new city centre deliberately echo the forms of its old mud-built predecessor.

Details of the old well mud pillars at Al-‘Udhaibāt well.

Opposite The main gate of Al-‘Udhaibāt house.

Najdi building forms and techniques have, in any case, been adapted for centuries. At ad-Dir‘iyyah both the 18th century palaces of the Āl Sa‘ūd, and the houses of the common people, differ in form, style and technique from later buildings both there and at Riyadh in the early 20th century. But these styles also share much in common, and they both evolved through the local people’s response to specifically local conditions. In each case these buildings, with their settings, created a unique spirit of place which has now vanished. In the early years of modernization this spirit of place was fatally injured by the onslaught of crudely designed concrete buildings, notable chiefly for their sheer anonymity and poor standards of construction. Latterly many fine buildings in the international style have appeared in Saudi Arabia’s cities. They create in their turn a new spirit of place, often a stimulating one. But it is a moot point whether such architectural pyro-







Modern commercial, residential and office development in Riyadh's Diplomatic Quarter draws on an unmistakably Najdi visual repertoire.

technics, however dazzling they may be, really represent a response to the cultural context into which they have been implanted. They are often excellent buildings in themselves. What is at issue is not their standards of design and engineering. Rather it is that they are fundamentally misconceived in terms not just of environmental efficiency but also of cultural aptness. An essential ingredient is missing identity.

The test question is, whether somebody would know where in the world they were if they were set down suddenly in most of the office buildings, hotels and shopping malls currently in vogue all over the developing world. The answer must be "No". The standardization of culture and expectations which such modish architecture represents is a depressing indictment of the imagination of planners, architects and their clients.

Fortunately for Saudi Arabia today, there is a hunger to explore other modes of architectural expression as an antidote to the essentially estranging effects of international fashion, and one can discern a dissatisfaction with much of what has been served up in the name of modernization. There is in planning circles a perception that the dictum "Form follows function", that mantra of the modernist movement in architecture in the West, while useful and cleansing as a basic planning discipline, does not go far enough. As an architectural commandment it may be necessary, but it is by no means a sufficient prescription for the designer's art. It has too often been used as a convenient cloak for a lack of architectural imagination and as an excuse for imposing tired, standardized building solutions.

These days one can point at a few exceptional developments in Saudi Arabia which do indeed reflect the cultural background of the people for whom they are designed. There is

more than one way to embody the functions of a building, and those that do it successfully offer their users more than just a machine for living or working in. They inspire a feeling of familiarity, of instinctive recognition. These are surely important functions of buildings and,



The Saudi Pavilion at EXPO '92, Seville, Spain, while housing a walk-through exhibition on Saudi Arabia, was itself a themed exhibit conveying layers of meaning: here a Najdi building in seeming ruin produces a modern structural grid in which traditional motifs are suspended.

hence, “Form follows function” should be interpreted not in a simplistic, utilitarian way, but in a wider sense which takes into account the cultural background of their users. Such buildings do not alienate, but neither they do have to be conservative. They can offer new aesthetic and environmental opportunities. The culture of their locality, so far from being seen as somehow anti-modern, actually provides the bedrock from which the concept of thoroughly contemporary building can grow.



The house at Al-'Udhaibāt, its rebuilding complete.

***Opposite* A typical tower farmhouse in Najrān, Saudi Arabia, built in the cob (mud layer) technique characteristic of the area.**

Much of the impetus behind these successful modern projects has come from the young planners and architects at the Riyadh Development Authority. Thus, when one stands in Riyadh's Diplomatic Quarter, or in the new city centre, one is forced to acknowledge that one could not possibly be anywhere else but in Riyadh. The place is instantly recognizable, because it draws on the forms of the old mud-built city centre which vanished after 1950. These forms have been adapted and magnified to cope with the needs of a modern city centre. Though they are writ large, this has not been done in a crass way, as so easily could have been the case. Not only have the functions of a modern Saudi city centre been properly fulfilled – mosque, markets, Justice Palace, Governorate; they have bridged the chasm between tradition and modernity by drawing on and reflecting Najdi forms as their inspiration.

The planning and design of the public areas embody a Najdi visual culture which make them immediately sympathetic to their Saudi users and recognizable to their foreign ones. Other Saudi projects have succeeded in the same way without in the least damaging their claims to modernity: for example, Riyadh International Airport, the Hajj Terminal at Jeddah International Airport, the Quba, Al-Mīqāt and Al-Qiblatain Mosques at Madinah, the Corniche Mosque at Jeddah, and the Saudi Arabian Pavilion at EXPO '92 Seville.

Most of these projects are, of course, in modern industrialized construction materials. There are incontestable reasons to why a Najdi spirit of place is something worth reviving, if only for cultural and aesthetic reasons, and some modern buildings perform that task well. But there are also good practical reasons for not allowing traditional Najdi materials and methods to die. To begin with, who knows whether



traditional materials may not prove capable of accommodating modern requirements? If they do, then the use of more modern and less environmentally friendly materials will become unnecessary. Furthermore, nobody can predict what the future holds. Decisions taken today, particularly those which represent a complete break with the past, may not be appropriate for future generations. In short, these skills may be needed again, albeit in different circumstances. At the very least, the old tradition holds many lessons for the future, even if many of the old skills turn out to be inappropriate.

In the long term, therefore, it is clearly important to preserve and improve upon a body of practical knowledge and skill which has been built up in Najd over thousands of years. Like a tree, such knowledge can take centuries to grow but, like a tree, it can be chain-sawed by rapid technological change. Such knowledge can vanish forever within a generation.

One group of lessons which can certainly be learnt centres around low-energy lifestyle. Here the past and still-living traditions in the undeveloped world have much to teach us. In the developing countries, man is in danger of forgetting how to design in co-operation with nature. One reason why modern buildings all over the globe tend to look the same is because they are designed to exclude climatic conditions, rather than to work as far as possible with them. The same materials are used universally to completely separate the inside from the outside. In hot countries, whether hot-dry or hot – humid, the price of complete separation is often greater interior discomfort, and the work of creating comfortable condition internally is given over to mechanical systems, which are expensive, indirectly polluting to run, and sometimes environmentally harmful when disposed of.



A well-preserved mud village near Sarāt 'Abīdah, south of Abhā, 'Asīr, Saudi Arabia.

In separating people from the outside, modern technology has had a further social effect: it has isolated individuals and families physically, in buildings and cars, from the neighbourhood public life which is such a strong feature of traditional Islamic settlement. We have solved our eternal need to communicate with our fellows by applying more of the same technology. But in fulfilling that need we have replaced much face-to-face communication with the means to communicate, electronically and on the instant, around the globe. There may be much advantage in this, but there has also been a cost: we live and work less and less in a tight physical community, and increasingly in a web of transportation and electronic communication systems.

One might say that the air-conditioning unit, in cars or buildings, has revolutionized the relationship of buildings, and the people who live in them, with their environment. Something vital has been lost when the old courtyard

A village near Abhā, ‘Asīr, Saudi Arabia, shows the characteristic building style of the wet highland area: the layers of mud wall are interspersed with layers of horizontal stone slabs which throw the rainwater off the walls, so protecting the mud.



space, open to the sky, becomes the central air-conditioned saloon space of a modern concrete house, sealed off from the outside world. It is as if, when we see our environment as the enemy (and this is all too understandable in the heat of a Saudi Arabian summer), we exchange the oppression we feel from the climate with the social and spiritual oppression of a closed dwelling. But it is not entirely a good thing when we sacrifice our relationship with our natural surroundings for constant physical comfort. We lose touch with the earth and the seasons. They may hurt us sometimes, but they are the basis of our physical existence. In the long term, and for the sake of future generations, we need to work and feel in harmony with them. Whatever



Right The mud-layer town of Sūq al-‘Inān, northern Yemen.

Opposite Al-Kharāb, northern Yemen.



spot it occupies on the face of the Earth, the courtyard house stands in a unique relationship with the sky. “The possessor of a courtyard”, wrote the American scholar George Kates in his memoirs of life in Beijing before the Second World War, “possesses both by day and night a well of light, which the seasons endlessly fill with incalculable riches.”

When, in 1985, Prince Sulṭān circled the Earth in the NASA Space Shuttle Discovery, he was deeply struck by the fragility of our planet, and the vulnerability of the biosphere which supports us. As he orbited, his arid homeland would turn into view, and he would speculate about the future of his country. On coming back to Earth he reflected upon the power of modern man to damage beyond repair the very system which supports him, and of which he forms a part. It is already a certainty that, with global warming and accelerating population growth, the very near future will bring an urgent need to return to low-energy, sustainable living. In the arid lands, at least, earth may be part of the answer for housing.

Earth architecture in the arid lands offers many advantages and opportunities, whether in the adobe (sun-dried mud brick) medium which typifies Najdi building, or in the *pisé de terre* (rammed earth layers) and cob (layers built without formwork) which are also found in Najd but are more common elsewhere. Mud architecture is not only beautiful and practical. Of all structures, those in mud are perhaps the most directly capable of expressing the culture of a locality, and even the taste of an individual, because they are made at the local level and are directly moulded by hand. Mud may have structural limitations, and it is certainly vulnerable to rising damp and water infiltration, but it compensates with its sculptural qualities. It is a hands-on architecture, shaped from the earth

Right The interiors of the circular brushwood houses, or *‘ushhāsh*, typical of the Tihāmah (the Red Sea coastal plain), are often plastered in mud and highly decorated, like this one near Jazan, Saudi Arabia.

Opposite Al-Khuraibah stands at the mouth of Wadi Dū‘ān, a tributary of Wadi Ḥaḍramawt, southern Yemen.





Top row left to right

- The mud-built town of Hajarain. Ḥaḍramawt.
- Shibām, the “Manhattan of the Sands”, in Wadi Ḥaḍramawt, eastern Yemen, is famous for its tall adobe houses, many of which rise to nine or ten storeys.



Second row left to right

- Many important mud buildings in eastern Yemen are coated with *nūrah*, or lime plaster. This view in Tarīm, in the Ḥaḍramawt, combines adobe building with a *nūrah*-plastered minaret, dome, and the famous tall minaret of the Miḥḍār Mosque behind, all built of adobe.
- The great 17th century fortress at Jabrīn, Oman, seat of the Ya’rubī Imāms.
- The ancient castle at Bahlā, Oman, combines several techniques of mud-building, including the distinctively Omani cone-brick method.



Third row left to right

- Near Aswan: Nubian villagers sit beneath a mud barrel-vault constructed by the method that Hasan Fathy attempted to revive in Egypt.
- The step pyramid of Djoser, Saqqara, Egypt – more than 4,500 years old.
- Ruins of a Coptic monastery near Aswan, Egypt.



Fourth row left to right

- The mosque in the village of New Gournā, Egypt – Hasan Fathy’s celebrated experiment to reintroduce adobe as the solution to the problem of low cost housing for the poor.
- Typical *pisé* and stone defensive storehouse, Atlas Mountains, Morocco.





Top row left to right

- The mosque at Agadez, Niger.
- Granaries in Cameroon, built in the thin mud-wall techniques found in much of tropical West Africa.
- A village of the Dogon tribe in the Sahel, Mali.



Second row left to right

- Villages of beehive-shaped houses like this dot the plains of northern Syria.
- An underground cistern, mud-domed and cooled by mud-built wind-tower, by the fortress at Faraj, near Yazd, Iran.
- A village in Rajasthan, India.



Third row left to right

- The western terminus of the Great Walls of China.
- Earth-built urban street frontage in Santo Domingo, Dominican Republic.
- The great ancient city of Chan-Chan, Peru, was raised entirely in mud brick around AD 1000.



Fourth row left to right

- The American Indian pueblo at Taos, New Mexico.
- Hayes Barton Manor, Devon, south-west England – a cob-built farmhouse thought by some to be the birthplace of Sir Walter Raleigh, and therefore more than 400 years old. Building in earth is widespread in rural France and southern England, despite the rainy climate. The cob-builders of Devon, who built on a raised stone foundation and finish their buildings with a thick thatched roof, say of their walls: “Give ’un a good hat and a good pair of boots, and ’e’ll last for ever.”

on which it stands. So it is also the most protean and varied of architectures. In every place that it occurs, it cannot help but play a powerful and distinctive role in the drama of an evolving spirit of place. Al-‘Udhaibāt Farm is an experiment to find a modern role in Saudi Arabia for an ancient and distinctive Najdi tradition.



Right The great mosque at Djenné, Mali.

Opposite The town of Ghardāyah in the Wadi Mizāb, Algeria.





2

Al-‘Udhaibāt: the Setting

Every people that has produced architecture has evolved its own favourite forms, as peculiar to that people as its language, its dress or its folklore. Until the collapse of cultural frontiers in the last century, there were all over the world distinctive local shapes and details in architecture, and the buildings of any locality were the beautiful children of a happy marriage between the imagination of the people and the demands of their countryside.

Hasan Fathy, *Architecture for the poor* p.20.

Opposite One of the colonnaded galleries (*ruwāq*) round the courtyard, al-Badī‘ah Palace.



The environment

Al-‘Udhibāt Farm is situated on one of the great wadis of central Arabia. Wadi Ḥanīfah drains the plateau of Jabal Ṭuwaiq which, with its dramatic west-facing escarpment, form a spine curving north-eastwards through central Arabia for hundreds of miles. This eastern part of the central plateau of Arabia is called Lower Najd. Composed of a series of longitudinal escarpments and intervening sand strips, its soft rock formations-sedimentary limestones, sandstones and shale – are easily broken down by weathering into gravels, sands and slits, carried into depressions and down the wadis by floodwaters. The wadis and depression of Lower Najd have been home to the settlers of central Arabia for at least 4,000 years.

As Wadi Ḥanīfah winds its way southwards, it is joined by several tributaries. Ground water is close to the surface, making cultivation possible by irrigation from wells. So the Wadi has been inhabited along its length by farming communities ever since agriculture first came to this part of Arabia. Some of these settlements have risen to power and prominence over the centuries: Ḥajr al-Yamāmah, al-‘Uyainah, ad-Dir‘iyyah and Riyadh.

Al-‘Udhaibāt occupies a particularly favoured spot just south of ad-Dir‘iyyah, where a great tributary, Sha‘īb Ṣafār, joins Wadi Ḥanīfah from the west, and there has probably been a farm here whenever in the past this part of Wadi Ḥanīfah has been settled. Local people say that the name itself connotes the sweetness of dates, though the dictionary definition gives its central meaning as being applicable to water: it is derived from *‘adhb* meaning “pleasant” or “sweet”, especially as applied to water, as in *mā’adhb*, “fresh water”. Names derived from this root, such as al-‘Udhaib and al-‘Udhaibāt,



Lush irrigated farmland lies on either side of the Wadi Ḥanīfah flood channel. Here we look towards the cliff of al-Qurain with its fortification wall, between al-‘Udhaibāt Farm and the ruins of Atturaif.



Spring flowers bloom in the crevices of al-‘Udhaibāt’s cliff.



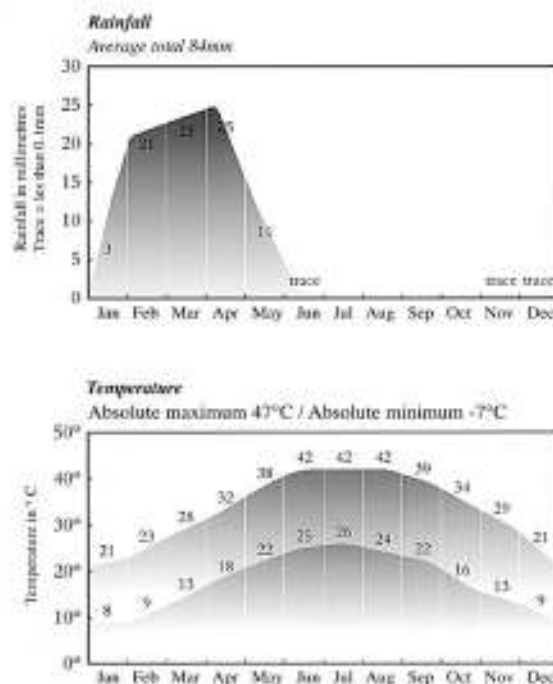
After heavy rain a lake forms behind the dam across Wadi Ḥanīfah at al-‘Ilb.



Sheep graze by one of the restored wells in the old plots, al-‘Udhaibāt.

Opposite A flooded palm grove in al-‘Udhaibāt.

Average maximum and minimum temperatures, and average rainfall in the Riyadh area. Relative humidity ranges from an average maximum from November to February of 40-50 per cent (50 per cent in December and January), down to an average minimum from June to August of 15-16 per cent.



are often found in Arabia where good water is available. Whatever the etymological considerations, a name evoking the sweetness of both water and dates is certainly appropriate for this idyllic spot.

Saudi Arabia is among the most arid of all the large countries on Earth. It falls within the desert belt which includes the Sahara Desert and most of the Arabian Peninsula. Its settled people have evolved methods of farming and subsistence in the face of an extreme challenge to human survival. Najd suffers a long, hot and almost totally dry summer. Daytime temperature can approach some 50°C in the shade with average July maximum 42°C. Its cloudless skies, and its position far removed from the moderating effect of the sea, bring temperatures varying sharply between night and day, and between summer and winter. However, low humidity palliates the perceived effect of both heat and cold. In winter, the November-January daily minimum temperature averages a comfortable 8-9°C, but this conceals the fact that hard frosts can occur, causing severe crop damage.

The prevailing summer wind comes from the south and is totally dry. In winter the cold, dry *shamāl* blows from the north, from central Asia. By the time these winds reach Najd they have lost most of their moisture, and so rainfall is very low. However, the *shamāl* is replaced in late winter by depressions tracking south eastwards from the Mediterranean, and these winds bear the meager rainfall of Najd, including the most valued, the *wasmī* rains of spring which bring the desert dramatically to life.

Rainfall around Riyadh, at an annual average of 84mm, is well below the 250mm which would make dry farming possible. It is only by reaching ground water by means of animal

Opposite Beneath the fortification wall ad-Dir‘iyyah, a waterfall tumbles over the cliff into Wadi Ḥanīfah after a spring storm.



draw wells, the traditional source of water for irrigation and daily needs, that people have been able to settle permanently on any scale in Najd. Even as it is, the local chronicles show us that settlements have frequently had to be completely abandoned because of drought, the drying up of ground water, starvation and disease. Al-‘Udhaibāt’s experience has been no exception.

Rainfall averages are especially misleading in Arabia as they conceal huge irregularities. Rain is at best an extremely erratic phenomenon, not only from year to year but in the short winter and spring. It can range from just 15mm recorded in 1966 to the 257mm recorded ten years later. Rainfall was plentiful in the winter of 1995-6, during the final stages of rebuilding the farmhouse at al-‘Udhaibāt: about 250mm fell from November to May, making it one of the wettest on record. When rain comes it is typical of desert rainfall, usually arriving in violent rainstorms. Half or more of a year’s rainfall may fall in single day. Such downpours can be very localized, and occasionally as devastating to people in their path as drought: torrential floodwaters roar through the converging tributary wadis to produce cataclysmic floods which have been known to sweep away entire settlements. On average four or five such floods turn Wadi Ḥanīfah into a temporary river in winter and spring, often as late as May. In a dry year this may occur only once or twice, while an exceptional season may bring as many as fifteen such storms.

The historical background

Al-‘Udhaibāt, with its tall palm trees, deep wells and adobe farmhouse, stands just fifteen kilometers north of that part of Riyadh city centre once occupied by the old walled mud-built capital, now all but vanished. Today, the northern out-



skirts of Riyadh, around the lavish campus of King Sa‘ūd University – almost a town in itself – threaten to encroach on the timeless charm of this stretch of Wadi Ḥanīfah.

This is the historic section of the great ancient Wadi. Less than a kilometer farther upstream, to the north, stand the crumbling walls and pinacles of Atturaif, the chief settlement of ad-Dir‘iyyah, the old capital of central Arabia. Its brooding ruins, still in parts monumental, convey a powerful sense of grandeur and a way of

Right The Salwā Palaces, the most imposing of the ruins of Atturaif, were started in the 18th century and completed early in the 19th by the Imām Sa‘ūd bin ‘Abd al-‘Azīz (“Sa‘ūd the Great”). The early palaces in Atturaif show a high quality of adobe construction and a distinctive architectural style which seem not to have survived the destruction of ad-Dir‘iyyah in 1818-19.



life now gone. Juxtaposed with the modern metropolis, ad-Dir‘iyyah epitomizes the contrast between the old and the new in modern Saudi Arabia: if you stand on top of the low cliff which encloses the old farm of al-‘Udhaibāt, you can see the buildings of the new town of ad-Dir‘iyyah on the east bank of the Wadi. That counterpoint permeates every aspect of life in Saudi Arabia today, where the rapid transition from traditional life to the late 20th century has taken place within living memory.

To Saudis old and young, ad-Dir‘iyyah is much more than a tumble of mud and stone ruins. As the capital of the First Saudi State (1745-1818), it is the symbol both of their nationhood, and of the reformed Islam which the 18th century Saudis spread through Najd and then throughout the Peninsula.

Based on true historical value and its international importance, Atturaif in Dir‘iyyah was included in the UNESCO World Heritage site list on July 31st, 2010.

Due to its national, cultural and environmental characteristics the development of Atturaif which is currently under way both in Atturaif and in its neighborhood Al-Bījairī is vital. Forty percent of its neighborhood is planned to be rehabilitated. Roads and lanes leading to ad-Dir‘iyyah, including an animal pasture will be developed. At present the historic site of Atturaif including Sa‘ad palace, Nāṣir palace, ‘Umar palace, Hospitality palace and the bath, three mosques including Sa‘ad, Bireka and Subālat Mouḍi is undergoing massive restoration work which is being undertaken by Al-Turath. In the second phase it is planned to restore and preserve other monuments including the Salwa palace, treasury (baitulmāl) and the main Atturaif mosque. This restoration plan will lead to developing Atturaif and ad-Dir‘iyyah as tourism and cultural centers of international standards.

However, Wadi Ḥanīfah’s historic importance can be traced back long before this, to the beginnings of Islam itself and beyond. Westerners often imagine the Saudi Arabia of old to have been inhabited entirely by nomadic bedouin tribes. It can come as a surprise to learn that nomads have probably never been in a majority, and that major settlements have flourished



throughout Arabia continuously from earliest times. Most Arabians were, in fact, settled cultivators, with a sprinkling of merchants and caravaneers – the forerunners of today's businessmen. Usually they were ruled either by a tribal warrior aristocracy or, in the case of settlements with various competing groups, by a ruler whose authority was recognized by all and who, in maintaining order, kept the balance between them.

Settlement traces its origins to the Neolithic period, and the first urban centres grew on the Gulf coast during Sumerian times some 5,000 years ago. The familiar Arabian picture of date palm oases and desert camel herders evolved between 3,000 and 5,000 years ago, and the camel-herding tribes were, from the start, dependent on settlements. Tribes often included both nomadic and settled sections, right up until the recent past, and there was always interchange between the two ways of life.

Saudi Arabia has several spectacular archaeological sites, none of them known to the international tourist trade. All were prosperous caravan towns during the period between 1000 BC and the 7th century AD. They stood on overland routes which fed the demand of the Mediterranean civilizations for the luxury goods of the Indian Ocean and the Yemen. The most photogenic of these today is Madā'in Šāliḥ, in north-west Arabia, with its spectacular rock-cut tombs, built by the Nabataeans, whose capital was at the more familiar Petra, the "rose-red city half as old as time" which attracts large numbers of tourists to southern Jordan. Other large sites are at nearby al-'Ula, Tayma' (once a royal seat of the last Neo-Babylonian King), Najrān, Qaryat al-Fāw and Thāj. When, in the 7th century AD, Islam was first revealed to the Prophet, it was in an es-

entially urban milieu-the trading and religious center of Makkah, itself a relative latecomer as an Arabian trading town.

Another relative newcomer was the area of ad-Dir'iyah itself and of Riyadh, where the pre-Islamic tribe of Banī Ḥanīfah was centred. One of their two chief settlements, Ḥajr al-Yamāmah, was situated somewhere near where the old city of Riyadh was later to grow. Though its exact locations have never been identified, it is thought to have been somewhere near the centre of the modern city.

Ḥajr already existed when, perhaps in the 5th century AD, the tribe of Ḥanīfah arrived and took it over from its original founders, the semi-legendary tribe of Jadīs. Under the Ḥanīfah, it became with al-Kharj the centre of a prosperous pre-Islamic tribal state known as al-Yamāmah. Al Yamāmah achieved a certain political and commercial prominence in the 6th and 7th centuries AD owing to its position on the overland route between the Gulf coast and Yemen. It was also an important producer of dates and grain, exporting to Makkah. Two of its rulers, Hawdha bin Ali and Musailama the "False Prophet", played colourful roles in the years leading up to the final conversion of the settlements of Wadi Ḥanīfah to Islam. One of the most bitter conflicts of the War of the *Riddah*, or Apostasy, took place at 'Aqrabā' near al-Jubailah, towards the head of Wadi Ḥanīfah, in AD 634, just over a year after the Prophet Muḥammad's death. The loss of life there was such that the decision was taken to commit the Holy Qur'ān for the first time to writing.

Ḥajr al-Yamāmah prospered during the early centuries of Islam, until the end of the 9th century AD. By then, the political centre of the Islamic world had shifted out of Arabia, first to Damascus in AD 661 and then, over the centu-



The newly constructed al-Badī'ah Palace, near Riyadh, was photographed by the British diplomat George Rendel in 1937, when he stayed there with his wife at King 'Abd al-'Azīz's invitation. Al-Badī'ah stood a few kilometers down the Wadi Ḥanīfah from al-'Udhaibāt. With its palm groves, stone retaining wall along the Wadi, and elaborate interior decoration, it was a fine place used for accommodating official guests in the 1930s, at a time when Amīr Faiṣal bin 'Abd al-'Azīz' had just acquired al-'Udhaibāt. The other, older palace at al-Badī'ah can just be seen to the left.

Opposite A carpet of grass and shrubs covers the plateau above al-'Udhaibāt in spring, especially along the flood diversion dykes, like this one, which direct rain-water into the farm below.

ries, to Baghdad, Cairo and, after 1453, to Istanbul. Najd was poor and isolated, the life of its people dominated by the austerity of their arid land. There is scant evidence for its history in the centuries up to the 15th, but we can surmise that the settlements were weak, and often dominated by new tribes entering from the west and south-west. We catch glimpses of the Muslim pilgrim routes to Makkah, of local rulers, and the interplay between the nomadic and settled tribespeople. Later, when the Ottoman Empire expanded during the 16th century, Turkish influence was established in western and eastern Arabia, and the Sharīfs of Makkah sometimes tried to extend their influence into Najd.

In those centuries Ḥajr seems to have declined but survived, for it was still there in AD 1331-2 when Ibn Baṭṭūṭah visited it, and described it as “a fine and fertile city with running streams and trees, inhabited by different clans of Arabs, most of whom are of the Banī Ḥanīfah”. The Ḥanīfah were still the dominant tribe in the area in the 15th century, when there began a large-scale revival and repopulation of settlements all over Lower Najd. They were submerged in the subsequent wave of settlement which followed the foundation of important towns like al-ʿUyainah and of ad-Dirʿiyyah itself. However, their ancient name survives to this day in that of the great wadi on which ad-Dirʿiyyah stands, and which is still lined on both sides by old farms, of which one of the most historic is al-ʿUdhaibāt.

Tradition holds that ad-Dirʿiyyah was founded in AD 1446. We are told that Ibn Dirʿ, chief of the Āl Dirʿ clan of the Banī Ḥanīfah who ruled Ḥajr, was anxious to increase his influence. This stretch of Wadi Ḥanīfah was not being utilized, and he decided to invite his kinsmen of the Murādah clan, who at that time were living near al-Qaṭīf on the Gulf coast, to settle it.

Opposite The flood-waters of Wadi Ḥanīfah surge past the gate of al-ʿUdhaibāt on the morning of 24th March 1996, after a storm.





A gazelle bounds down a cliff on the estate.

Ibn Dir' gave them the plots of Mulaibīd and Ghaṣībah in the Wadi, and the Murādah named their new home ad-Dir'iyyah, after their old home on the coast.

The Murādah grew in power and influence, while Ḥajr declined. From their chief town at Ghaṣībah and their other villages they controlled this part of the Wadi and colonized further afield. But by the 17th century internal divisions had laid them open to competition from elsewhere. Riyadh was growing where Ḥajr had flourished, and another rival in the northern Wadi had risen to prominence: al-'Uyainah. Al-'Uyainah was to dominate southern Najd until ad-Dir'iyyah achieved preeminence after 1725 under Muḥammad bin Sa'ūd, the first ruler of the House of Sa'ūd and founder of the First Saudi State.

By this time the configuration of farms and settlements in ad-Dir'iyyah had grown considerably. The name applies not to a single settlement, but to an area of towns, villages and farms—a wadi-based oasis—on either side of a four-kilometre stretch of Wadi Ḥanīfah. Its northern limits were the groves around Ghaṣībah. Cultivation extended north to the villages of al-'Awdah and al-'Ilb, where the dam is today. The town of Ghaṣībah stood downstream on the east bank, about four kilometres below these. Ghaṣībah was probably the earliest seat of power, before Atturaif rose to prominence, perhaps during the 17th century – the two towns reflecting the rivalry between the Āl Waṭbān and Al Rab'ah branches of the ruling house. At Ghaṣībah the Wadi Ḥanīfah bears eastwards, and the left bank below Ghaṣībah was lined with a series of farming villages extending past the bluff of Atturaif on the opposite bank. One of these villages, right opposite Atturaif, was to achieve distinction after 1745: named Bujairī, it was

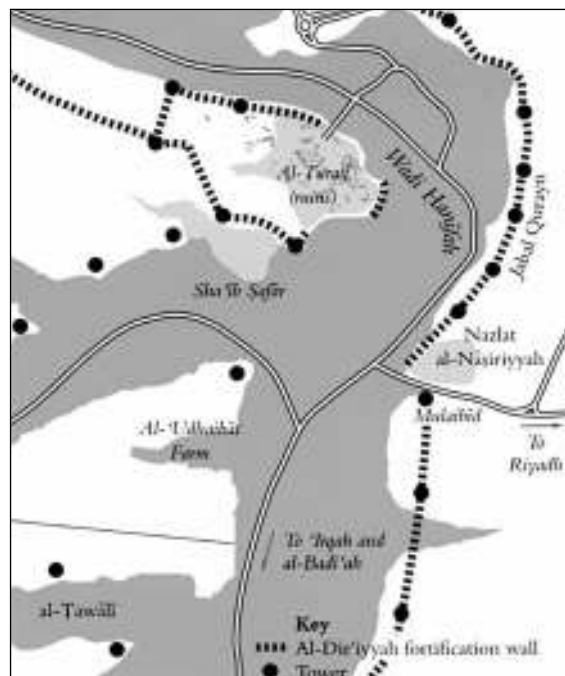
where the great reformer Shaikh Muḥammad bin ‘Abd al-Wahhāb resided with his family and disciples.

East of Atturaif, the Wadi is forced to make a sharp turn to the south-west by the scarp of al-Qurain. The bluff of Atturaif is bounded on its southern side by a large tributary, Sha‘īb Ṣafār. This joins Wadi Ḥanīfah opposite a pass ascending the cliff of al-Qurain Nazlat al-Nāṣiriyyah, which was the main route to Riyadh. Just south of the pass, on the left bank, lies the fertile farming area of Mulaibīd, with Ghaṣībah the first of the settlements of ad-Dir‘iyyah to be founded in the 15th century.

Mulaibīd marks the southern end of the oasis of ad-Dir‘iyyah. On the opposite bank of Wadi Ḥanīfah the oasis ends in a number of farms lining the right bank of the junction with Sha‘īb Ṣafār. The most important of these is al-‘Udhaibāt Farm.

Al-‘Udhaibāt is the name given originally to just one of the six gardens which were brought together in the 1930s by the late King Faiṣal bin ‘Abd al-‘Azīz’, who gave the name to the new amalgamated farm. There has been a farm here for at least 300 years, and, given its location opposite the attested early settlement of Mulaibīd, very probably for much longer. The earliest mention of al-‘Udhaibāt belongs to the 17th century: it is related that in 1100 AH/AD 1688-9 Muqrin bin Markhān, chief of the Muqrin branch of the Murādah, revived the farms here at the time that he established Atturaif as the chief town of the oasis. The farms were developed as part of an effort to bring into productivity lands which were previously unowned. This was seen as a public work, and money from the public treasury was used to do it. As the Imām Muḥammad bin Sa‘ūd was a descendant of Muqrin, the farms were controlled by the rul-

Fortification in the neighbourhood of al-‘Udhaibāt.



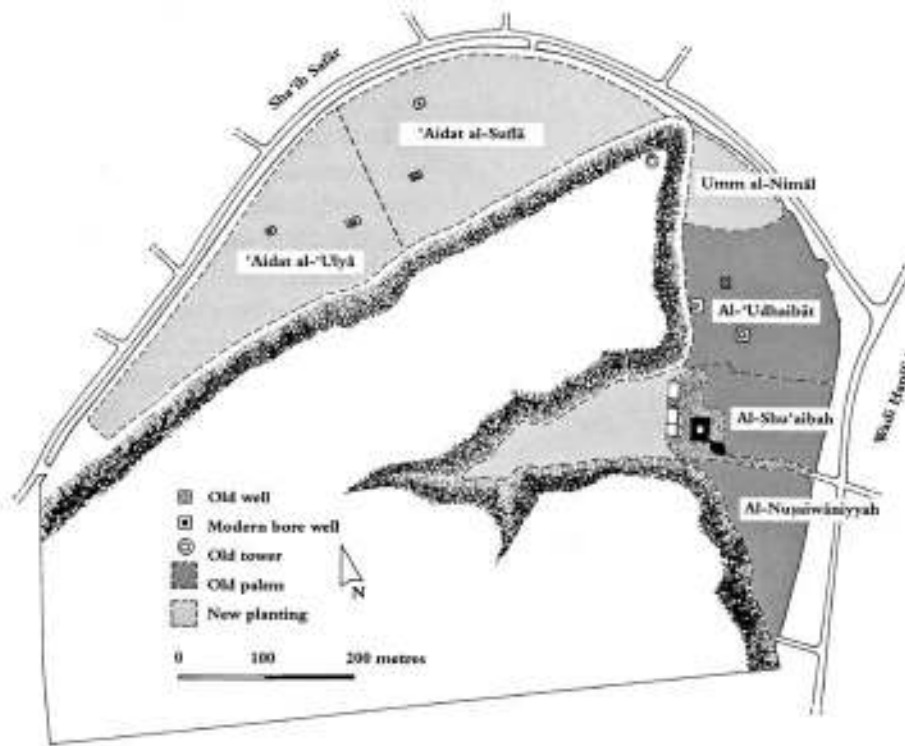
Muḥammad Ali’s general was his son Ibrāhīm Pasha. Ibrāhīm’s strategy was to roll up ad-Dir‘iyyah and its settlements from the north. However, his efforts were attended by frustration at the stubbornness of the defenders and, occasionally, by catastrophe, such as the explosion of his entire ammunition dump. Ad-Dir‘iyyah was vulnerable from the south, via Sha‘īb Šafār and Nazlat al-Nāširiyyah. The heights of al-Qurain by the latter were defended by a great battlemented wall. Atturaif just to the north was of course heavily fortified, but the wide Sha‘īb Šafār presented a worrying problem to the defenders.

Watchtowers were built on either side of it at strategic points, as with all the other tributaries flowing into the oasis: the tower on the southern side was located in al-‘Udhaibāt Farm, and still survives to this day. A detachment of militiamen under the Amīr Sa‘ūd bin ‘Abdullah bin Muḥammad Āl Sa‘ūd was entrusted with the defense of this entire southern sector. Sa‘ūd bin ‘Abdullah thus broke an undertaking he had given a few months previously to Ibrāhīm Pasha after the falloff Ḍurmā, not to take any further part in the fighting, and, when he was captured in the final stage of the siege, he was summarily put to death. However, his defense of the southern sector seems to have been effective, for although Ibrāhīm tried in the latter stage to cut off supplies to ad-Dir‘iyyah from the south, by taking ‘Irqah, he continued to concentrate his efforts on forcing his way down Wadi Ḥanīfah from the north. And that is how Atturaif was eventually taken, in September 1818.

The old watchtower atop the cliff at al-‘Udhaibāt.



The invasion was aimed at the destruction of ad-Dir‘iyyah and its religion-political influence. The reform movement was seen outside Arabia at the time as heretical, despite the fact that it saw its mission as merely to revive the original precepts of Islam and rid it of the ac-



Al-‘Udhaibāt estate, showing the junction of Sha‘īb Šafār and Wādī Ḥanīfah.

cretions of intervening centuries. The razing of ad-Dir‘iyyah in 1819, however, did not crush the reform movement, which survived further Egyptian occupations of Najd in the early 1820s and late 1830s. Its mantle passed to Riyadh, which was chosen in 1824 as the seat of government of a revived Saudi ruling family. The reform movement’s ideals inspired the Second Saudi State during the reigns of the Imām Turkī (1824-34) and his son Faiṣal (1834-8 and 1843-65). The factional strife which followed the Imām Faiṣal’s death, and the ensuing rise of Ḥā’il, let to the eclipse of Riyadh in 1891 and the voluntary exile of the House of Sa‘ūd. However, with the young Ibn Sa‘ūd’s revival of his family’s pre-eminence after 1902, the ideology of the reform movement was to be central to the triumph of settled values, the rule of law and the transcending of tribalism imposed by Riyadh immediately before the modern era.

Ad-Dir‘iyyah may have been crushed as a political power, but good farmland in Najd does not go uncultivated for long. We know that al-‘Udhaibāt lay neglected after the destruction of ad-Dir‘iyyah, but it seems that it remained part of the public treasury and thus remained under the control of the Āl Sa‘ūd rulers of Riyadh. We next hear of it in 1300 AH/AD 1882-3, during the difficult years at the end of the 19th century. Two members of the al-Buraiddī family (Ḥamad bin Muḥammad and his nephew ‘Abdullah bin Ibrāhīm bin Muḥammad) came to an agreement with the public treasury to revive al-‘Udhaibāt by replanting it, on the understanding that 25 per cent of the revenue would go to the treasury. Things went well for some years until, as often happened in the old days, a prolonged droughts killed the palms and the farm was abandoned again.



The Amīr Faiṣal bin ‘Abd al-‘Azīz (later King Faiṣal) attending the Palestine Conference in London in March 1939, when he was Foreign Minister and Vice-roy of the Hijāz. He had been the owner of al-‘Udhaibāt Farm since 1928, using it as a retreat and doing much to improve it.

Soon after, a second attempt was made to resuscitate the farm. This was in 1318 AH/AD 1900-1, when the Āl Sa‘ūd were in exile in Kuwait and Riyadh was ruled by the Al Rashīd of Ḥā’il. It seems that in this year there was relinquishment by the public treasury of farms belonging to it, into the hands of those who were working them. A certain ‘Abd al-Raḥmān bin Khamīs (also known as Abu Ḥassan), restored the western part of al-‘Udhaibāt. A little later he was joined by Ibn Baishān, who in 1333/1914-15 planted more date palms. However, that was a bad year. Good and bad years were given nicknames as an *aide-mémoire*, and 1914-15 was remembered by Najdis as “Ujaijān” (meaning “dust-laden”), owing to the high winds and the lateness of the rains. Perhaps it was for this reason that Ibn Khamīs allowed himself to be bought out by Ibn Baishān.

Ibn Baishān appears to have been a personality of some repute. In the age before newspapers, radio and television, the news was passed around by word-of-mouth. Knowledge of the past and current affairs existed only in people’s minds. A certain vividness of imagery was essential to making events and people memorable, as a means of creating a communal oral history. For example, as we have seen, years might be given descriptive names. Poets, with their gift for graphic expression and the telling phrase, achieved prestige as vehicles of group history, as they described events, deeds, and personalities to their audience in their rhythmical, rhyming oral verse. They might be celebratory, satirical or just reflective. Ibn Baishān and al-‘Udhaibāt survive in a poem by the renowned Najdi poet Nāṣir al-’Urainī, which displays all these traits:

*You rider on the she-camel’s back
You’ll soon have the pleasure of being at
Ibn Baishān’s domain.
It’s a place where javelins’ tips are snapped.*

*Even strong men tremble at its name,
For many's the time it's seen the slaughter
of the strong and blest.
Whenever you reach al-'Udhaibāt you'll
find it never turns away a guest.*

In 1914-15, during Ibn Baishān's tenure of al-'Udhaibāt, the young Amīr 'Abd al-'Azīz had already embarked on the series of campaigns which was to lead to the unification of the regions which today form the Kingdom of Saudi Arabia. The process had begun with his daring recovery of Riyadh in 1902. By 1912 the first of the Ikhwan *hijrahs* (settlements) had been set up at al-'Arṭāwiyyah in northern Najd, and in 1913 he ejected the Ottomans from al-Ḥasā'. Between 1919 and 1926 he progressively incorporated 'Asīr, Ḥā'il, al-Jawf and the entire Ḥijāz into the Saudi domain which, in 1932, was formally proclaimed the Kingdom of Saudi Arabia. Although the 1930s were lean times for the young state, modernization had begun in the early 1920s with the introduction of motor transport and wireless telegraphy. The first aircraft made their appearance. The foundations of modern administration were laid and, during the 1930s, oil prospecting began, to culminate in the epoch-making discovery of oil in commercial quantities near Dhahran in 1938.

The expansion of Riyadh during the 1920s and 1930s and the growth of population in and around the old capital was placing great strain on food and fodder resources. To meet the surge in demand, most of which had to be met from local sources, King 'Abd al-'Azīz embarked on a concerted effort to increase agricultural production, particularly on the family estates. It was in this context that, in 1928, the Amīr Faiṣal bin 'Abd al-'Azīz acquired al-'Udhaibāt from Ibn Baishān. As well as al-'Udhaibāt he bought the neighbouring gardens



The adobe-built capital, Riyadh, is shown here in the *Illustrated London news* of 17 March 1928, the year in which the Amīr Faiṣal acquired al-'Udhaibāt Farm. In 1926 his father 'Abd al-'Azīz had been proclaimed King of the Ḥijāz and Sultan of Najd and its Dependencies. These photographs were in fact taken by the Lebanese-American writer Amīn Riḥānī during his visit to Riyadh in 1922-23.

Right George Rendel in one of the colonnaded galleries (*ruwāq*) round the courtyard, al-Badī'ah Palace 1937.

Opposite interior of one of the guest rooms at al-Badī'ah in 1937, showing the elaborately carved plasterwork.



of al-Nuṣaiwāniyyah, al-Shu'aibah, Umm al-Nimāl, 'Aidat al-Sufla and 'Aidat al-'Ulya, bringing them all together under the one name of al-'Udhaibāt.

The garden of Wadi Ḥanīfah had always been of great amenity value to the people of Riyadh. The British explorer and Arabist 'Abdullah Phillby (H.St J.B. Philby), in *The Heart of Arabia*, describes the outings and picnic which took place in the Bāṭin, the particularly verdant stretch of Wadi Ḥanīfah which curves close to Riyadh, during his visits to Najd in 1917 and 1918.

The Bāṭin is a favourite resort of the citizens of Riyadh and particularly of the royal family on high days and holidays, when they hie thither in great numbers with their horses to make merry with shooting matches, mounted displays, and other sports the livelong day from early dawn till evening, feasting and coffee-bibbing and praying at proper intervals.

Philby *Heart of Arabia* vol.1 p.369

Amīr Faiṣal was at this time, at the young age of twenty-two, his father's Viceroy of the Ḥijāz, and in 1930 he was appointed Minister of Foreign Affairs also. He it was who built the original house in the al-Shu'aibah plot which we now see restored by his nephew Prince Sulṭān. Faiṣal was a devout man of simple and ascetic tastes and the house, while spacious for a Najdi farmhouse, was anything but ostentatious. As well as the house, he had the mosque built, but on a different alignment to the restored one we see now, and arranged for the estate to be properly managed.

He reorganized the six plots into a single farm partly by diverting flood water Sha'īb Ṣafār into a channel along the foot of the rock outcrop and round into Umm al-Nimāl and al-'Udhaibāt.

He enlarged the well by the farmhouse. He ordered a programme of replanting, not just of date palms but of citrus and other fruit trees, fodder and vegetables. Under a series of head gardeners, the number of date varieties was increased to more than thirty, including al-Manīf, Nabut Ḥamr, Nabut Saif, Muskānī, Salij, Saq‘ī and Khuḍarī. In 1370 AH/AD 1950, the first mechanical pumps were installed, and these enabled him to increase the number of palms to more than one thousand. King Faiṣal cared for the estate even after coming to the throne in 1964, and used it as a retreat until his death in 1975. It reflected the spirituality of a great man who, as his life progressed and even after he became king, never lost his austere habits of daily life.

With the establishment of Saudi Arabia as a recognized nation state and the granting of the first oil concession, the 1930s were a decade of rapid development for the capital. Foreign diplomats and oil company personnel began to make frequent appearance in Riyadh, although they were not conspicuous as they were encouraged to wear Saudi dress. During their visits King ‘Abd al-‘Azīz accommodated them in grand Najd style in the new summer palace and royal guest house he had built at al-Badī‘ah and in the Bāṭin. This traditional hospitality made a vivid impression on these visitors: Gerald de Gaury, Andrew Ryan, Reader Bullard, Harold and Violet Dickson, George and Geraldine Rendel, and Prince Alice, Countess of Athlone among the Britons; and the oil geologist Max Steineke among the Americans. Although life was on a grander scale and things were done so as to impress foreign visitors, the idyllic atmosphere of al-Badī‘ah’s gardens and its style of architecture and decoration was very much the same as it would have been at al-‘Udhaibāt when King Faiṣal developed it in the 1930s.





Farming communities of Wadi Ḥanīfah

The settled, farming communities of Najd were composed chiefly of tribes people who could trace their origin to one of the great bedouin tribes, past or present. They lived in small tribal farming villages along the wadis of Lower Najd. Occasionally some of these small settlements would coalesce and attain political dominance over their neighbours, leading to a process of centralization which would culminate in the establishment of a town, with its seat of government, markets and central mosque. Eventually this process of state formation might lead to the emergence of one of the towns as a real regional authority, like ad-Dir‘iyyah.

Their rulers were drawn usually from the clan which had founded or taken over the settlement. The ruler’s power was based not only on his acceptability to the community, but also on the ownership of the settlement’s land, which belonged to his clan by right of foundation or conquest.

By gift or long-term lease he could attract other tribal supporters and settlers, so building up his position. A tax was levied on all produce, the amount varying according to the amount of work required to put the land into production. For example, if a well had to be built and the land planted, the tax would be low. Some lands, especially those won by conquest, were held by the public treasury (*Bait al-Māl*), which was controlled by the ruler but whose funds had to be used and distributed in certain prescribed ways for the public good.

The settled people always had strong ties of kinship or mutual self-interest with the nomads and semi-nomads. There might sometimes be conflict between them in times of drought or hardship, especially over water rights, and the nomads affected to despise the settled way of life. But at a deeper level both were partners in the struggle to extract a subsistence from their harsh environment: the nomads utilized the vast desert to raise camels and goats, and produce the animal products which the settlers needed, and the settlers produced foodstuffs and manufactured items needed by the nomads. Settlements had attachments of kinship or convenience to particular tribes, the bond so formed being useful to both sides in peace and in war.

With political stability, a reliable water table and hard work, the Najdi farmer could subsist and produce a surplus of dates, cereals and fod-

der. In the Najdi settlements, however, political stability often fell victim to factional upheavals within, or to conflict with neighbouring towns. Generally, the villagers and townspeople of ad-Dir'iyyah and Wadi Ḥanīfah had little to fear from the nomads. Their ruling families were the dominant force in local politics and, from the 18th century on, the House of Sa'ūd completed the process by which settlers and the values of settled life came to dominate, control and, finally, to incorporate the nomadic bedouin.

The large well in the Shamsiyyah garden of King 'Abd al-'Azīz, photographed by Capt. Shakespear in March 1914. The men are members of Āl Sa'ūd. Shakespear described this well as drawing twelve buckets, and recorded that it had been built by Maḥbūb, the chief retainer and "foreign minister" of the Imām Faiṣal in the 1860s, who described by Palgrave and Pelly.

***Opposite* Date cultivation requires palms to be climbed in the traditional way, for pollination and harvesting.**





Agriculture and livestock

Much of the farmland on either side of the Wadi Ḥanīfah flood channel occupies a raised step of fertile soil 3 to 5 meters above and on either side of the Wadi bed. The edge of the step was protected from flood waters by a retaining wall of large stone blocks, which can still be seen in some places today, and which has been rebuilt at al-‘Udhaibāt. Occasionally the flood waters after storms reach such a height that they surge through openings in the wall to reach the foot of the rugged cliff marking the edge of the wadi behind the plantations, doing considerable damage as they do so.

Wadi Ḥanīfah is still cultivated in this way, with farms and hamlets occupying much of its length between its northern reaches at al-Jubailah and al-Kharj, ninety miles to the south. Najdis preserve a tradition that, in centuries past, the whole Wadi was lined with continuous farms, so that important news, such as the birth of a son, could be passed down its entire length, by shouting from farm to farm, in the course of a single day.

The key to a farmer’s success was continuous irrigation. Irrigation of cereal crops would normally begin after ploughing and sowing, at the end of the autumn but before the winter rains, which usually started in December. It would then continue for the next five months, the work becoming more and more arduous, as the crops grew and the heat intensified, until the harvest in late April. Then, during the summer months, irrigation of the date palm gardens, with their associated crops of fodder, vegetables and fruit trees, had to continue. A symphony of creaking and whining well wheels, day and night, formed the constant background music to life. Distribution channels were unlined, and so wastage was considerable. This limited the size

of gardens, which tended to be not more than one hectare in extent.

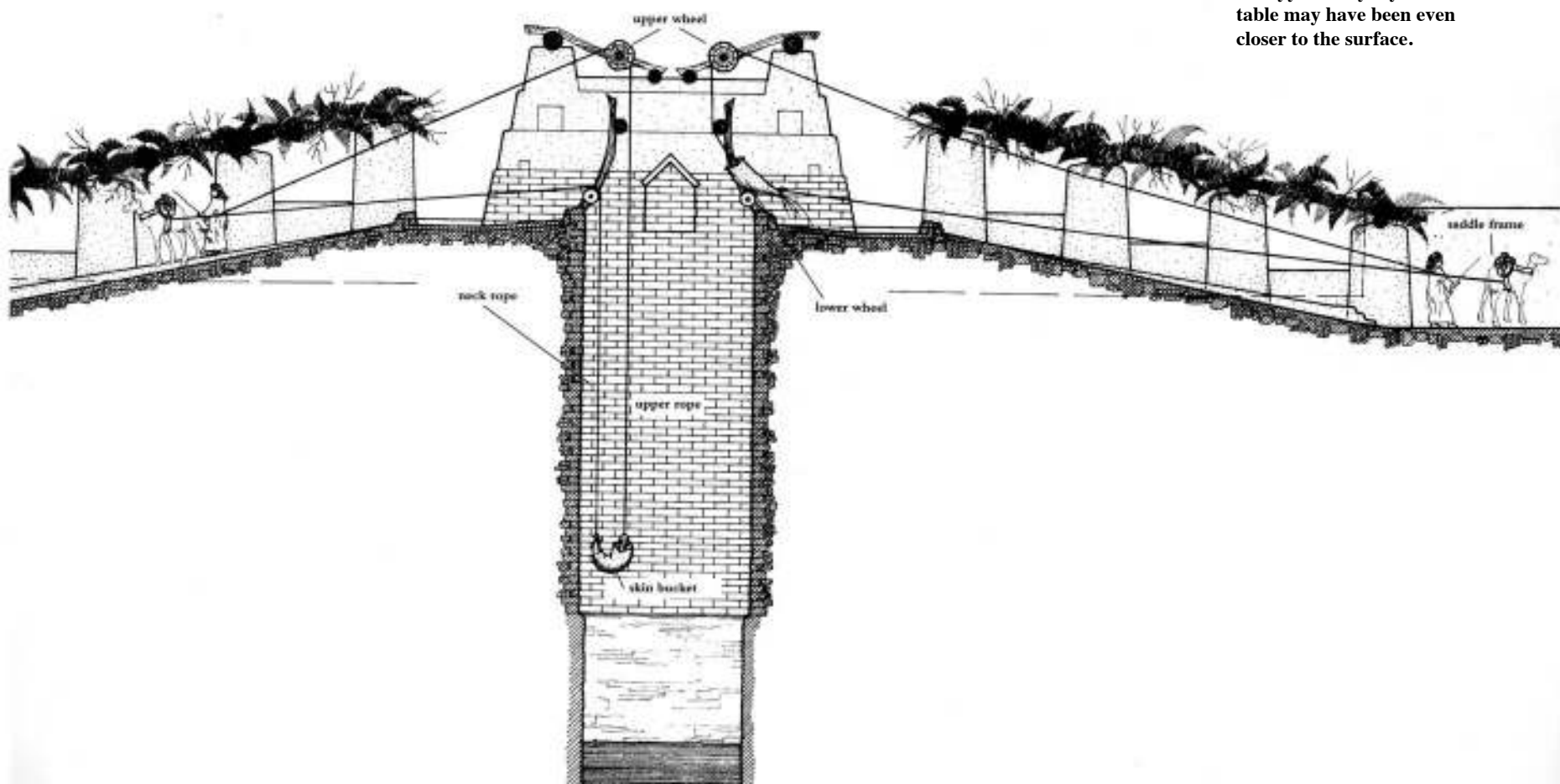
Vital to the whole system was the date palm (*Phoenix dactylifera*). Not only was it the staple source of food, fuel, fodder and raw material for household items and building, but it provided the environment in which many other plants could be grown, most especially vegetables and fruits – many of which can thrive only in the partial shade within or next to palm plantations. Palms were planted at 6-meter intervals. They also have a high salt tolerance and hence were well adapted to local conditions. Even so, rising soil salinity from bad drainage could cause serious problem. So crucial to the Arab idea of agriculture throughout history has been the date palm that it is venerated by Muslims. There is even a Tradition (*Hadīth*) that the Prophet Muḥammad (PBUH) himself said: “Among tree there is one which is like a Muslim, and that is the palm tree.”

Cereal crops-wheat, barley and millet (*dhurra* – sorghum, guinea corn; and *dukhn* – pearl or bulrush millet) – were almost as important as dates. Their cultivation in Arabia is as old as oasis farming. Wheat and barley were grown on irrigated land, and also on silt flats outside the irrigated area. The Wadi Ḥanīfah settlements had ploughs made of wood, sometimes with an iron tongue to break the soil, and were used to plough in the wheat and barley grain after manuring and sowing. Millet was grown as a summer crop within the irrigated area.

Alfalfa (*barsīm*, lucerne) was the chief crop after dates, wheat and barley. Vivid green alfalfa plots were a common sight among the palm groves. A prolific crop which can be cut three or four times a year, alfalfa was and still is vital as a highly nourishing fodder for camels, horses and cows.

Opposite The old palms of al-'Udhaibāt are well cared for and laden with fruit every year.

Without irrigation from ground water sources, farming in Najd would have been impossible. Since early times great stone-lined wells (*sāniya*, pl. *swānī*) have been dug down to the water table. In the recent past at least, the depth of wells in Wadi Ḥanīfah was commonly about 20 meters, judging from the length of surviving donkey ramps. This was quite shallow by central Arabian standards. In ad-Dir'īyyah's heyday the water table may have been even closer to the surface.



Vegetables were grown within the date gardens generally occupying the space between the date palms. Fruit trees might be planted between the palms or along the edges of date groves. In the old days, vegetables and fruit were only grown on a limited scale, for the family's own use. Fruit trees were even occasionally grown in the courtyards of houses in the old days. When Palgrave walked down Riyadh's main street in 1862 he observed "on each side...large houses, generally two storeys high, wells for ablution, mosques of various dimensions, and a few fruit trees planted here and there in the courtyards". 'Abdullah Philby, writing about southern Najd in the 1920s, records a wide variety of garden produce: onions, beans, aubergines, cucumbers, okra, cotton bushes, figs, grapes, peaches, apricots, a small apple, pomegranates, mulberries, melons, lemons and the large thick skinned citrus known locally as *tranj*. Many familiar

plants – apricots, peaches, watermelons and aubergines among them – are thought to have been introduced as a result of the Muslim conquests of North Africa, Spain and Sicily during and after the 7th century AD, while Arab traders introduced Seville oranges, limes and lemons from India into Oman during the middle ages. The latest species to be introduced would have been those originating in the Americas, such as tomatoes, maize and squashes. Garlic has certainly been grown for a very long time, and most of what Philby saw had undoubtedly been cultivated in gardens such as al-'Udhaibāt for at least three hundred years. In the spaces in between the vegetables the women would plant herbs and spices such as coriander, fenugreek, peppergrass, cumin and safflower, which were used in the preparation not only of food but also of medicines and cosmetics.



A well at Atturaif, near al-'Udhaibāt, is still being worked by donkeys.



The great well at al-'Udhaibāt after completion

The other main tree, with the date palm, of the Najdi settlement was the *athl* or tamarisk, *Tamarix aphylla*, whose feathery foliage is still a ubiquitous sight today. It is very easy to grow, requiring surface water only during its first year, afterwards putting down a long taproot to the water table. Like the *ṭarfā'* tree, *Tamarix passerinoides*, the *athl* absorbs moisture from the air, morning dew and fog, and is salt-resistant. Its uses were many, for roof timbers, doors, window shutters, general carpentry, firewood, wind-breaks and dune stabilization.

Goats and sheep were the main livestock, kept in small flocks which were entrusted to goat-herds during the day. Most families had a cow of the small humped variety which they kept for milk in an enclosure by the house. Mules or the large white Ḥasā' donkeys were the principal source of power for carrying and water lifting, but a few camels were also kept in the set-

tlements for carrying and riding. Camel-raising was, of course, the business of the nomadic tribes and, in times of military emergency, camels would have to be brought in from the desert. Horses were highly prized but expensive to keep, and were kept chiefly by members of the ruling family and the well-to-do.

The operation of the well in the gardens of ad-Dir'iyyah was done by donkeys and mules. This is an ancient system, and the evolution of the Najdi animal-drawn well probably goes hand-in-hand with the evolution of oasis agriculture and date palm cultivation in central Arabia, which perhaps reaches back to the third millennium BC. Well-digging, like house-building, was normally done on a co-operative basis, under the direction of a master-builder, with neighbours and relatives helping without payment.



3

Adobe Building in Najd

Architecture which was really architecture proceeded from the ground and...somehow the terrain, the native industrial conditions, the nature of materials, and the purpose of the building.

Frank Lloyd Wright, "First London Lecture",
in *An Organic Architecture*, London 1939.

Opposite Sitting in the garden, al-'Udhaibāt.



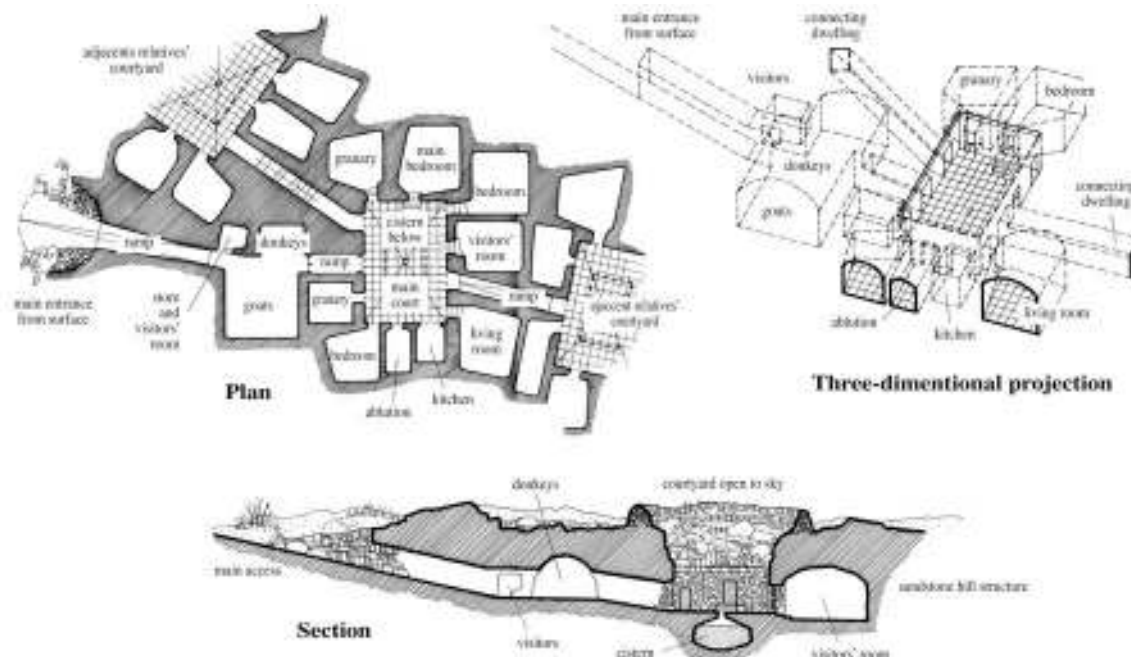
The courtyard house

The courtyard house – or, more strictly, the atrium house, meaning a house with an internal courtyard open to the sky surrounded by rooms – represents a commonsense response to the problems of a windy, dusty environment. So such houses are found, not surprisingly, in all the arid regions of the world. But the form has also been adapted to wetter, temperate zones, notably under the Roman Empire, when the atrium villa was commonly to be found as far north as Britain and Germany. The domestic courtyard, like the walled garden, answers a deep need – certainly a social one, and perhaps an existential one too: the desire for an enclosed, secure piece of outside space, placing one's daily life in a unique relation with the sky and the seasons.

For Arabians, the night sky, the moon and the stars hold a special place which, in their heat-seared land, they have not accorded to the sun.

The night is a time of coolness and ease when the sky can be looked at, and can become familiar, in complete contrast with the hostile, blinding glare of day. This relationship with the sky found lyrical expression during an interview with Hasan Fathy in 1978, when he said:

In the typical courtyard house, open space is closed entirely to nature at ground level, which is necessary to shelter from the heat and glare. ... We also know, according to aerodynamics, that wind blowing above the house will not enter the courtyard, but will pass over and create eddies inside. Thus, the courtyard will retain the cool air that has settled there, and the air will seep into the rooms and walls, cooling the house. This represents the mercy of God coming from the sky, and explains why in Islam the Deity resides in the sky. Thus the courtyard house did not arise from something spiritual alone, but it added the spiritual to the functional.



Opposite Wall and chimney details at 'al-'Udhaibāt.

Left Underground courtyard dwelling, Matmata, Tunisia.

Traditional courtyard houses survive today in East Africa and Iran, as well as in Iraq, Saudi Arabia, Oman, Yemen, Jordan, Egypt, Tunisia, Morocco and other Arab countries. Underground atrium houses are known from as far back as 3000 BC, and can still be seen today, for example at Matmata in Tunisia and in Isfahan, Iran.

Mud-built courtyard houses provide particularly effective protection against heat when they are grouped together with shared party walls in neighbourhood blocks: then fewer of the walls are exposed to the heat. Old Najdi towns like Riyadh were built like this, with continuous rooftops punctuated only by the light-wells formed by the courtyards and by the narrow streets.

In tribal societies especially, where the close-knit nature of kinship groups co-exists with insecurity outside the group, the protection and privacy of the family becomes a priority. The courtyard house answers this need very effectively. This social advantage has combined with the climatic effectiveness of the courtyard house to produce a very enduring architectural form in Arabia.

In Najd it is typified by the square or rectangular house, often on two or more storeys, with rooms arranged round and opening onto a colonnaded courtyard. Thick external walls present an essentially featureless face to the outside world—except where they are perforated on upper levels by patterns of ventilation holes in the form of triangles and lancets. Since it is so well suited to the social and physical environment of Najd, there is no need to look elsewhere for the origin of the Najdi courtyard house. It is most likely to be a case of convergent evolution here, and it is probably pointless to seek its origin in cultural diffusion from another source.

As we have seen, the climate of Najd is typical of a hot, arid zone. On the Red Sea and Gulf coasts of Saudi Arabia, where the intense heat is accompanied by high humidity, buildings are designed to catch any breeze available, and to use cross-ventilation. Najd, by contrast, located far from the moderating effect of the sea, is a region of wide temperature differences, notably between day and night. Najdi buildings are designed to make as much use as possible of the cool night air and the cold radiating from the night sky, and to exclude the dust-laden winds.

As there is usually a complete absence of screening by cloud cover, the ground receives an enormous amount of solar radiation by day, some of which it absorbs and some of which it reflects. Desert temperatures can rise to 50°C in the shade. Exposed surfaces can reach 80°C or more. Humans cannot survive such conditions for more than a day without shade and water. This heat radiates out from the ground again during the night.

Clearly, if a building is subjected to the same treatment, the comfort of the people inside it will depend on the heating up of the building being delayed for as long as possible. The rate of heating is determined by the thermal properties of the walls and roof.

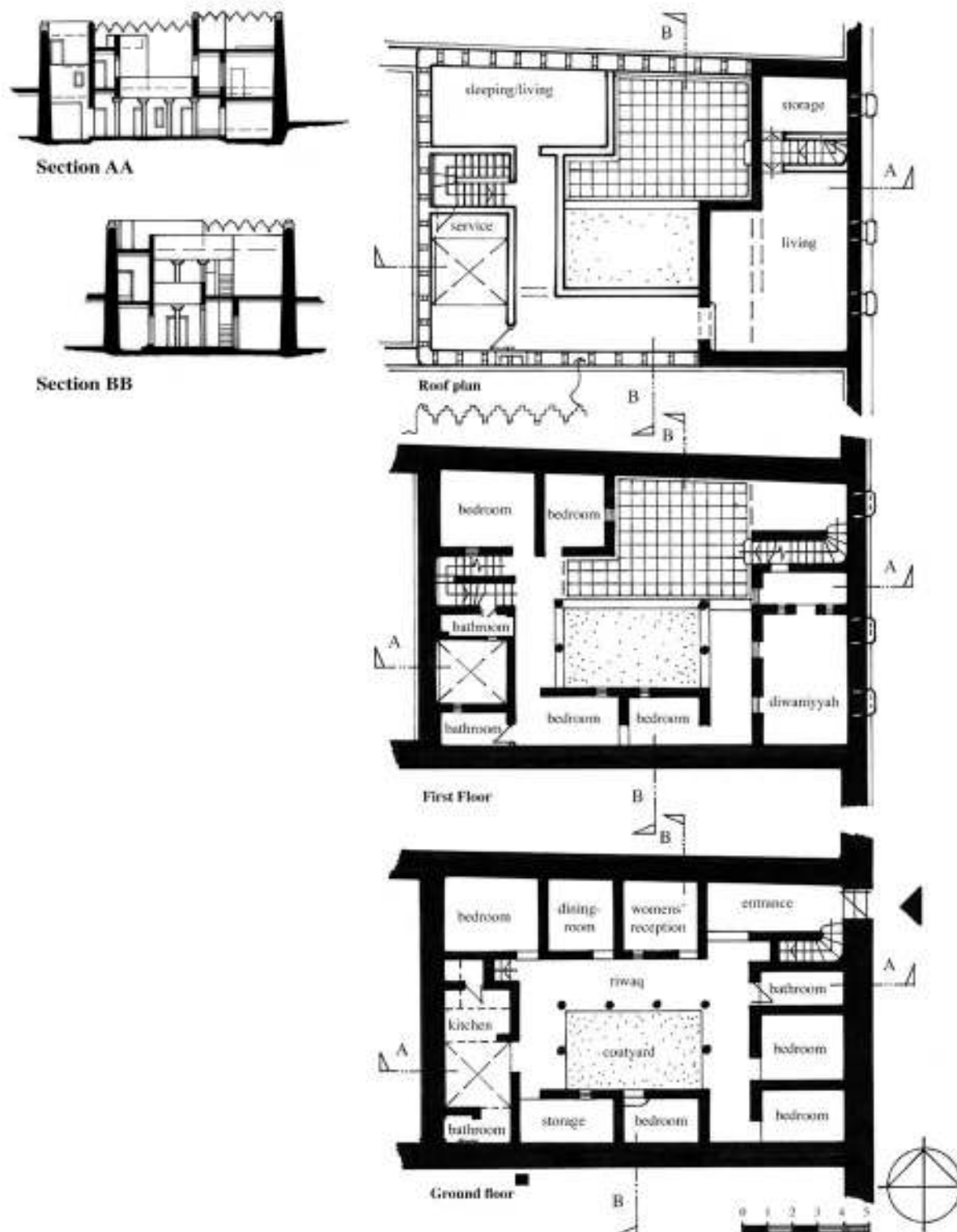
Materials which conduct little or no heat are known as thermally inert or of a high thermal capacity. They therefore insulate the interior of a building from exterior conditions more efficiently than materials of lower thermal capacity, which are thereby less thermally inert. Much debate in recent years has centered on whether or not earth as a building material performs better as an insulator than does concrete.

Opposite A typical Najdi courtyard in one of the al-Badī'ah Palaces, 1937.



Islamic courtyard houses are of two types: the interior courtyard or at atrium type, in which the courtyard is enclosed by rooms; and the exterior courtyard type, in which the courtyard is not enclosed by the house. The atrium type is commonly found in Najdi towns, while the exterior courtyard is more often found in rural areas.

Typical Najdi courtyard houses are conceived from the inside out, with the decorative elements concentrated inside essentially blank façades. This strong introversion is accompanied by the strict segregation of family life from the reception of guests on the male side of the house. Sometimes two entrances, two staircases and two sanitary blocks are provided to cater for this separation of functions. Extensive use is made of transitional circulation spaces by the inclusion of a colonnaded gallery round the courtyard on each storey, which also modifies glare and provides shaded outdoor space. The ground floor is used for storage and animals, although there may also be a *diwāniyyah* or reception room adjacent to the entrance, adorned with elaborate stucco wall friezes. Most of the other rooms can be used interchangeably for eating, sleeping, recreation and domestic tasks. Room functions often change according to the season of the year. (Drawing after Mousalli, Shaker and Mandily)



Another way of stating the principle of thermal inertia is to say: the more heat it takes to warm up a particular material, the more thermally inert it is: it warms up relatively slowly, and so is more effective as an insulator. Casual observation and everyday experience have often led people to believe that earth does perform better than concrete in this way. Fathy conducted tests in Egypt in the 1940s, and came to the startling conclusion that a well-made mud brick might be almost four times more thermally inert than a hollow concrete block. But it has only recently been scientifically demonstrated beyond doubt that earth's perceived superiority is indeed real, notably in tests carried out by two engineers, one British and one Saudi Arabian, Dr. David Webb and Dr Šāliḥ bin 'Abd al-Raḥmān al-'Ajlān.

Heat conductivity in building materials is measured in watts per square meter per °Celsius, which gives what is known as the "U" value of a material. The lower its "U" value, the lower its conductivity-thus, the better it is at insulating the interior of a building from the outside. The tests carried out by al-'Ajlān gave the results shown in the diagram, left.

The test show that the thermal inertia of this stabilized sun-dried mud is considerably higher than that of concrete: it can perform with up to three times the efficiency, as an insulator, of a concrete block. Unstabilized adobe blocks, of a type similar to those used at al-'Udhaibāt, show approximately the same thermal inertia as fired brick, and about twice that of concrete blocks.

Thermal inertia is often referred to as the "time lag" of the construction material. It is estimated that a wall of unstabilized adobe and of average thickness and quality can take up to twelve hours to heat through on the hottest day.

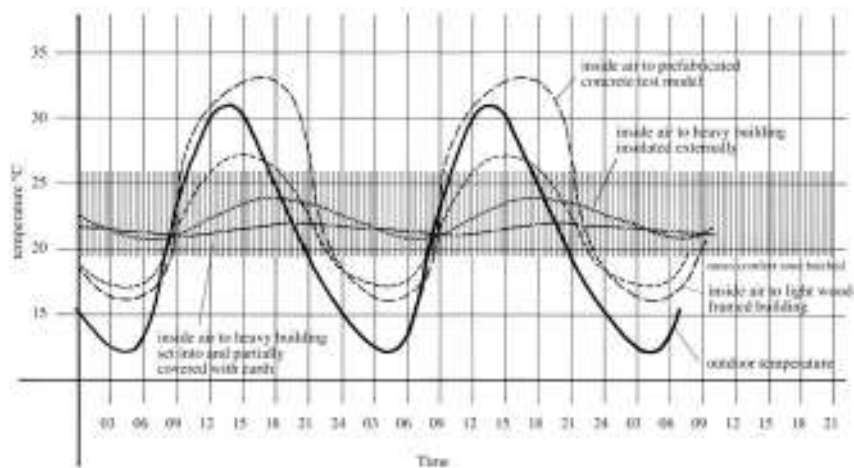


Above A house of exterior courtyard type in 'Unaizah, al-Qasīm.

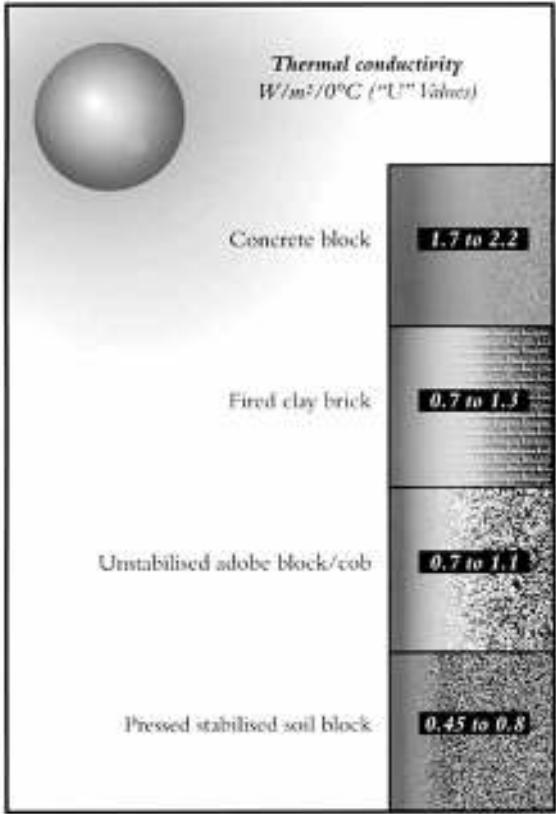


Left Al-Maşmak, the famous fortress captured by King 'Abd al-'Azīz in 1902, is preserved in the centre of Riyadh as a national monument. Internally it is organized as a series of interlinked courtyards.

Outdoor temperature fluctuation and its effect on indoor temperature for various constructions.



3.3 Diagram: comparative “U” values



Right The stabilized soil blocks used in these tests were actually made from soil suitable for adobe-making brought from the Riyadh area, mixed with 4 per cent cement, compressed at 10 newtons per square millimeter, and then sun-dried.

Opposite Mud towers and walls dominate the streets of old Riyadh, 1937.

Rather as the thermal capacity of the sea evens out coastal climatic temperature variations, so the time lag of an earth mass evens out temperature changes in a space enclosed by it.

The same conditions heat up concrete a good deal faster—which is to say that concrete’s thermal inertia is rather low by comparison with that of sun-dried mud. People’s anecdotal observations that mud houses seem to remain cooler for longer than concrete houses have been satisfyingly confirmed by these tests. That now seems rather obvious in hindsight, for concrete houses with solid walls always have to be mechanically cooled, whereas some mud houses do not. It can now be said with confidence that this is at least partly because of mud’s greater thermal inertia. Sun-dried adobe seems to be one of the very poorest of heat conductors available to builders. So sun-dried mud, as well as being freely available, is also ideally suited for buildings in a hot, arid climate.

Much depends, of course, on the constituents of the mud mix, the degree of compaction, the amount of straw added, the amount of moisture retained in it, and the care with which the adobe or mud layer is mixed and compressed. The precise performances of different types of adobe and stabilized earth still have to be scientifically established. Further research is required, such as that currently being carried out by, among others, the CRATerre team of the Grenoble School of Architecture in France, and the School of Earthen Architecture, Plymouth, UK.

There is one other factor which certainly contributes greatly to the thermal efficiency of earth walls, which we must also take into account. Concrete’s structural strength and the economics of building mean that walls are constructed as thinly as possible, so providing the

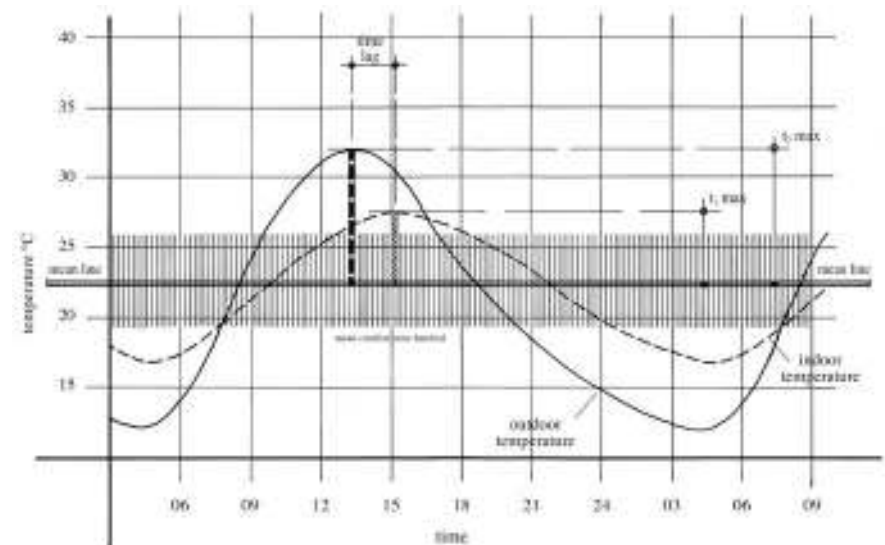


minimum protection from heat. Here, earth's relative structural weakness actually works to its advantage as an insulator: walls have to be thick, so providing extra protection from the heat. Its thermal capacity or heat storage value is thereby increased, and temperature change through its thickness impeded even more.

Of course, the difference in thermal inertia of materials does not matter much in an age of almost limitless cheap energy and air-conditioning equipment. Concrete, steel and structural clay tile are affordable commodities in an affluent society such as Saudi Arabia today, and there is no doubt that they can be used to create larger, more versatile spaces. As air is a very good insulator, careful construction of cavity walls can afford much of the same protection from heat as a dense, heavy material like mud.

Time lag and temperature decrement factor (for a light wood-framed building).

decrement factor = $\frac{t_i \text{ max}}{t_o \text{ max}}$ where t_i temperature indoors and t_o = temperature outdoors, measured from daily mean





A grand *dīwāniyyah* in Ḥā'il, northern Najd, 1914.

Opposite Houses of extended families in old Riyadh usually adjoined each other, but sometimes access had to be built across a street, as seen here in 1937.

In any case, the free availability of earth for building does not mean that it automatically wins the economic argument. It is not necessarily cheaper today to opt for mud rather than concrete. Cement, concrete blocks, baked bricks and clay tile are mass-produced, with all the economy of scale which that brings. Building in mud has remained a small-scale craft industry. While the raw materials may have a cost advantage, making a building in adobe is very labour-intensive: the mud has to be handled up to seven times to get it from source to the brick in the wall and, in a wage economy, this can make a mud wall more expensive than a concrete one.

However, the industrial production of modern materials entails other costs: centralization, energy use and transport affect the environment, and the standardization of components imposes an aesthetic penalty. Mud's harmony with the natural environment gives it a major advantage which we have not yet learned to cost into the equation. By making a crude, immediate-cost comparison, we ignore the long-term impact. It is rather like comparing intensive, high-input agriculture with organic farming: the former seems cheaper now, but its unsustainability may make its eventual environmental and social cost too high.

So, in a more environmentally responsible future, when the potential of passive – that is to say non – mechanical – methods of cooling will have to be taken seriously, mud's qualities will certainly restore its role in housing and even in architect-designed housing projects, as it has already done in some arid parts of the developed world, notably in the south-western United States. Even in Europe mud is currently enjoying a renaissance. It is, of course, still possible to build badly in mud, and architects will have to take care to be sensitive to the traditional environment in which they are working.

Yet mud's thermal capacity, however much we may extol it, does bring a sting at the end of the day: taking a long time to heat up means that it also takes a long time to cool down at night. Having heated up slowly all day, mud's time-lag ensures that a ground-floor room will be hottest in the evening. Mud houses therefore are not necessarily good places in which to sleep in summer, unless there is a dramatic night-time temperature fall as there often is in dry desert climates – although they certainly are comfortable in winter. On hot summer nights the solution is to sleep on the roof, exposed to the radiant coolness of the night sky, as Najdis have always done. Sleeping on the roof these days may go against the grain of modernity, but there is no inherent reason why it should not be revived in a more environmentally aware world. By morning, when the roof is becoming uncomfortably hot, the ground floor rooms will have lost their heat and become cool once more.

The advantages of building in sun-dried mud can be augmented still further by choice of building plan and orientation, and it is here that the courtyard house proves itself a winner. Quite apart from the social benefits to the Muslim family of a courtyard house, in terms of the privacy and enclosed open-air space that it affords, the atrium plan so characteristic of Najdi building has a number of distinct environmental advantages.

First, at night the courtyard acts as a sink for the cooler air on the roof, helping the cooling of the downstairs rooms, which have plenty of doors and other apertures opening onto the courtyard.

During the day, of course, the courtyard heats up quickly, especially when the midday sun strikes the courtyard floor. Then the heating



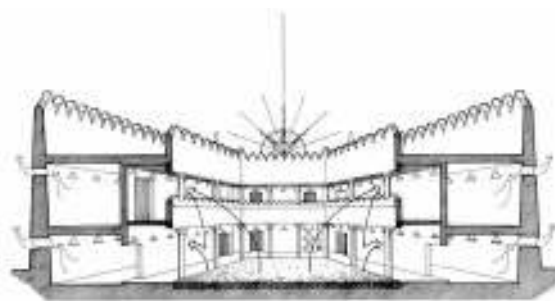
Night: courtyard and roof act as cool air sink.



Day: sun heats the courtyard, warm air rises creating chimney effect and pulls breeze through rooms.



Evening: courtyard and building retain heat then give it off as night air cools.



Opposite The great city wall of Ḥā'il northern Nadj, in 1914.

of the air within the courtyard creates a chimney effect: hot air rises, pulling air through the rooms from the outside and setting up a breeze. If this air has already passed through an irrigated palm grove on its way into the house, the cooling effect will be increased.

Next, the courtyard will always have a shady side, but care is taken, by the addition of a colonnade, to shade the inward-facing walls of the house from the direct light of the sun, so improving the coolness of the rooms. If only one side of the courtyard is shaded in this way, then it will be the northern side with its south-facing inner wall. At al-'Udhaibāt Farm, that wall and its opposite number outside the *dīwāniyyah* are shaded by colonnades, while the other two sides are left exposed.

The courtyard, especially in buildings of two or more storeys, is also vital as a light well, because of the lack of external windows, and lets daylight into all the rooms as required. If the courtyard is surrounded wholly or partly by a colonnade, as it almost always is, then the daylight is filtered and loses its glare.

Most obviously, a courtyard building with its inward-looking windows and blank outside walls provides effective protection from wind and wind-borne dust and sand. More than this, however, the courtyard house makes the most effective use of a phenomenon of aerodynamics seldom appreciated in contemporary architecture.

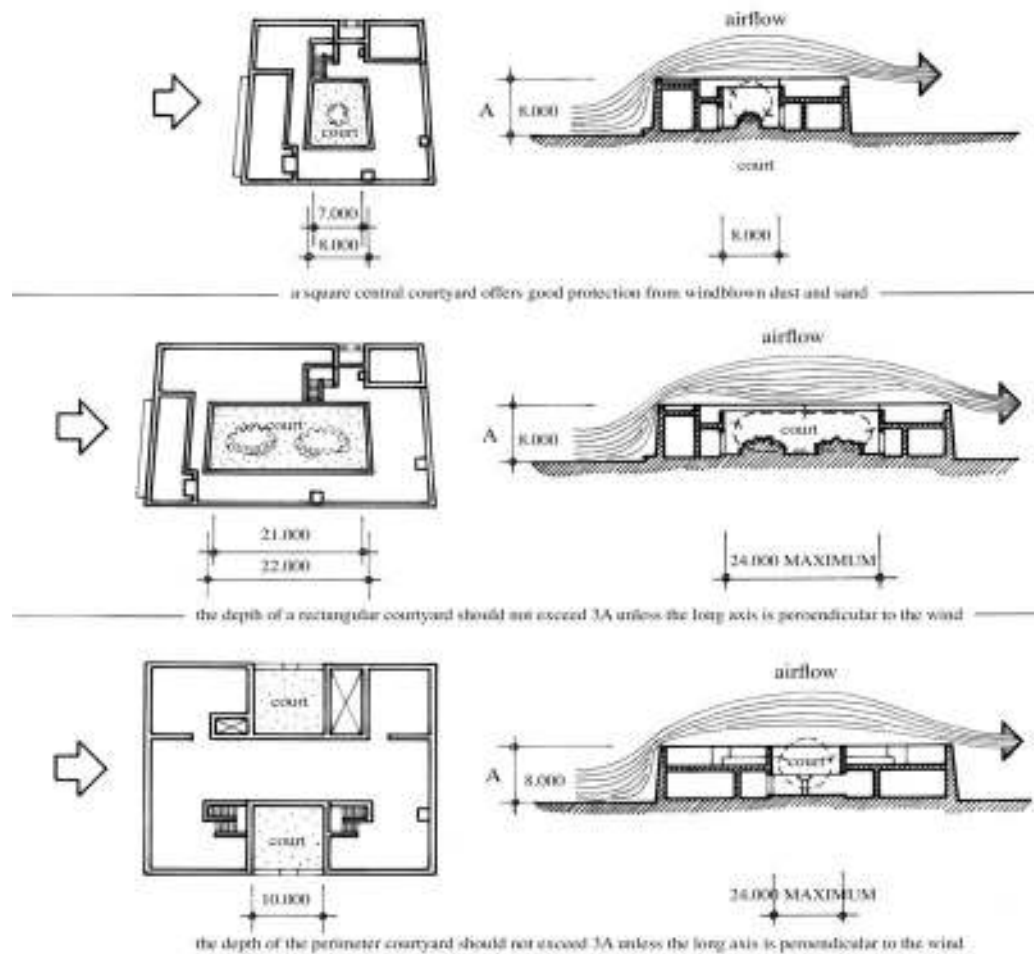
This phenomenon arises from the behavior of air as it passes over a building. Imagine a simple rectangular building open on one side. If you want to maximize the ventilation inside it, the commonsense thing to do would seem to be to position it with its open side facing towards the wind.



In fact, and paradoxically, one must do precisely the opposite, for two reasons. First, in an arid climate facing the open side of the building downwind mitigates the dust problem. But, more interestingly, facing it this way can actually increase the air flow through the building. This is because the airflow over and around the building creates low pressure inside it. If you perforate the back wall of the building with a few ventilation holes, placed high up to minimize dust, the low pressure inside the room will actively suck air in through the holes, creating a steady breeze. The larger the opening facing downwind, the stronger

will be the breeze coming through the holes. As a general principle the aerodynamics in this case require that, to maximize airflow, the exit aperture of the air should be as large as possible, and not, as one might expect, the ingress.

What happens, then, if one takes the “commonsense” approach and faces the building’s open side into the wind? Unless it is open on both sides to let the air pass straight through, the airflow will actually be reduced. The room will indeed fill with air, but because it cannot escape sufficiently quickly owing to the small



Right Wind and dust blowing over a courtyard house. Wind passing over creates a low-pressure zone in the courtyard. This sucks in eddies, but the low pressure can be counteracted by airflow through rooms into the courtyard created by well-placed apertures and by the courtyard’s chimney effect.

Opposite The Palace of Sa’ad is one of the two restored early palaces of Atturaif .



The house of Amīrah Nūrah, sister of King ‘Abd al-‘Azīz, in 1935. The house was situated in open ground between the wall of old Riyadh and the Murabba’ Palace to the north.

size of the exit holes, it will be a high-pressure zone, creating turbulence within and forcing the breeze to pass over the building instead of into it.

It is of course unlikely that traditional Najdi master-builders knew how to formulate the laws of aerodynamics as applicable to building design. Nonetheless, centuries of trial and error, in trying to increase comfort in adverse conditions, have certainly taught them a few empirical lessons. The evidence that these have been applied can be seen quite clearly in the traditional Najdi style and methods of building. What, for example, could be more typical of a Najdi building than the blank external façade, perforated high up with a row of triangular ventilation holes, with the room inside opening away from the wind and into a courtyard? The virtue of the courtyard building is that this effect is available no matter which direction the wind is blowing from. Whatever the prevail-

ing wind direction, at one time or other during the year each blank wall will be facing upwind. The breeze passes over the house, creating low pressure in both the room and the courtyard. The airflow through the ventilation holes tries to fill the low-pressure area, creating a flow out through the room, and into the courtyard.

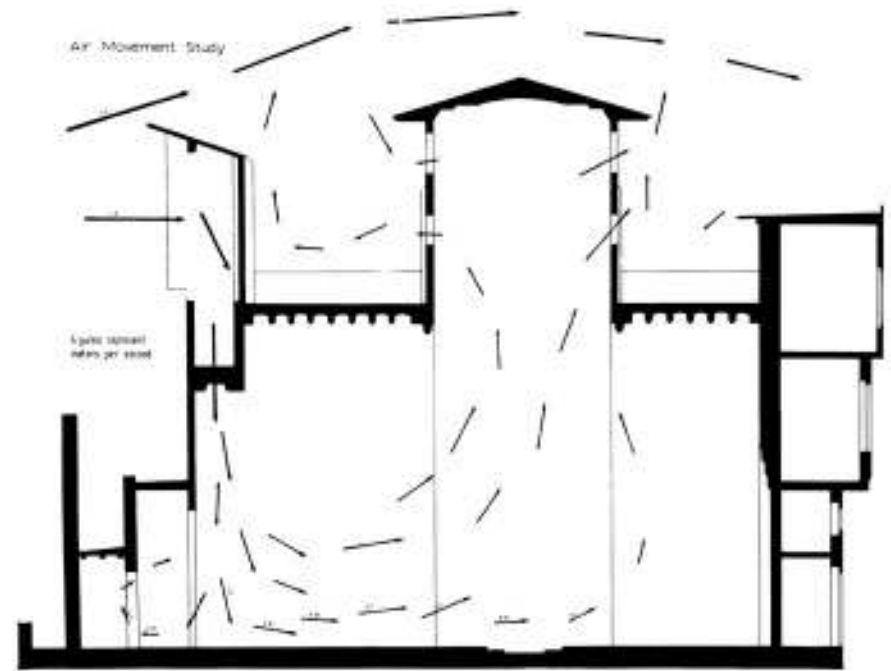
Here it counteracts the low pressure caused by the wind passing over the house, and it rejoins the main airflow above. This effect is of course increased by the chimney effect of the courtyard during the day: as the air in the courtyard heats up during the morning, it rises, drawing cooler air after it through the ventilation holes in the surrounding rooms. In a Najdi farmhouse like al-‘Udhaibāt, the palm groves adjacent to it play a vital role in the overall comfort planning of the interior, for the breeze is cooled and relieved of much of its sand and dust burden as it passes through the palms and over the irrigated soil before reaching the house. On the



hottest days, a shade air temperature of 48°C can be reduced to 40°C in the middle of a palm grove: a very substantial cooling effect. The vegetation also reduces glare and erosion of the building.

In addition to the cooling effects created by the courtyard, wind towers/catchers have also been used for centuries as a passive ventilation/natural cooling technique in the hot arid zone, such as in Pakistan, Afghanistan, Persia, Egypt and lately in the Gulf States. Various names are given to the wind towers/ catchers; they are called Malqaf in Egypt, and Badgir in Persia.

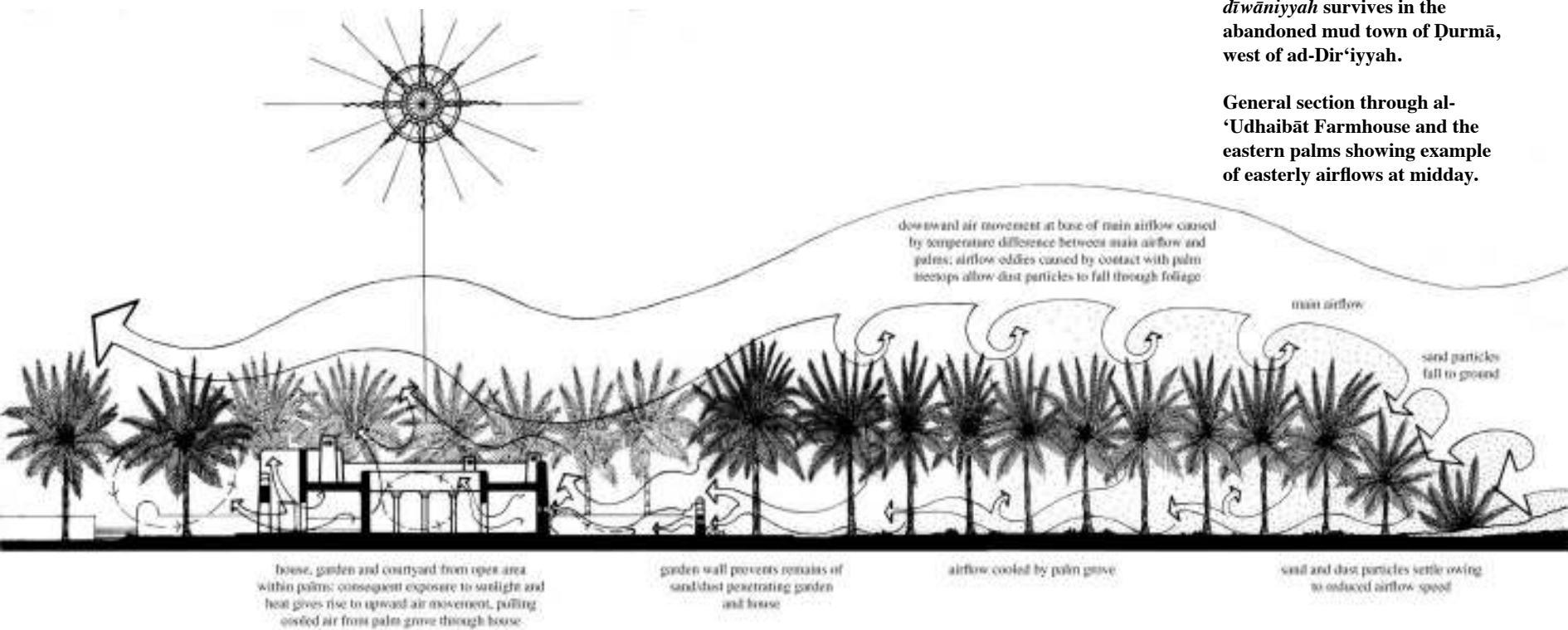
The tower consists of a shaft with an inlet opening at the top and an outlet opening at the bottom. The air moves from the top of the tower following the reversed chimney effect principle, passing over water to cool down and finally arriving at the bottom of the tower.



Air flow and speed measurement inside a house in Cairo, Egypt, Equipped with Malqaf.

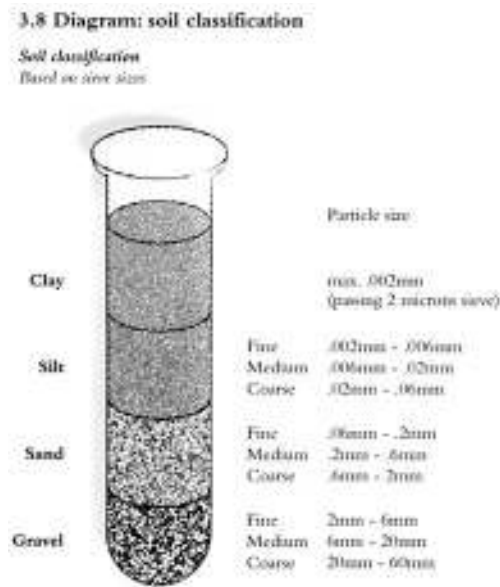
Following page A fine decorated dīwāniyyah survives in the abandoned mud town of Ḍurmā, west of ad-Dir'iyyah.

General section through al-'Udhaibāt Farmhouse and the eastern palms showing example of easterly airflows at midday.









Soil classification based on sieve sizes.

Traditional Building techniques

Adobe, that is to say sun-dried mud brick, is the traditional building material of Najd. Its ready availability and thermal inertia, combined with relatively simple building techniques, have made it an almost perfect building material for the environment – if it were not for its lack of durability, which is perceived as a problem to-day.

The owner of a mud house has to be prepared, as all Najdis were in the past, constantly to repair it, especially after the torrential Najdi storms. Mud, unfortunately, is not water-resistant. Its binding clay can be washed away when water flows over it, and the mud absorbs infiltrating water which, if it cannot dry out, leads to swelling, instability and sometimes collapse. There is not, as yet, an ideal solution to this problem. Many experiments have been conducted to increase the resistance of sun-dried mud brick to water penetration. Bitumen and various chemicals added to the mix, and the application to the finished surface of the wall of chemical resins and other solutions, have all been tried and tested. While all are effective in some ways, they have corresponding drawbacks. Ethyl silicate applied to the dry finished surface has been proved over time to give a good result, but even that treatment, when it is used on an old building, breaks the basic rule of conservation by being irreversible.

Perhaps the best results have been obtained by “stabilizing” the mud mix by adding 4-6 per cent cement to it and then compressing it in a brick mould before drying in the sun. Various projects in the arid lands have demonstrated the durability of this material (some samples have lasted for more than five years immersed in water without showing damage) – but that raises the question whether we are any longer dealing with a truly traditional material.

Some plain and simple, unstabilised sun-dried mud bricks are more durable than others. The quality of the raw materials available, the recipe used by the builder, and the care that goes into the preparation of the mix, are all determining factors. For instance, the mud mix used in the construction of more recent traditional Najdi buildings, such as the houses built when Atturaif was briefly reoccupied in the 1960s, seems to be of a greatly inferior quality compared to that used in the preparation of the bricks and mud plaster of the early palaces.

The essential ingredient of a mud brick (*labin*) is clay (*fīn*), found in natural deposits in Najd, usually in the presence of ground water. Clay is a mineral with the necessary adhesiveness to bind into a solid mass, but its stickiness renders it difficult to work with on its own. Clay absorbs a lot of water and expands as it does so; subsequent drying produces much shrinkage. So a thick mass of clay will crack and break up as it dries unless it is tempered with other materials.

Thus in making bricks the trick is to reduce as far as possible the amount of water which has to be added. This is done by reducing the pro-

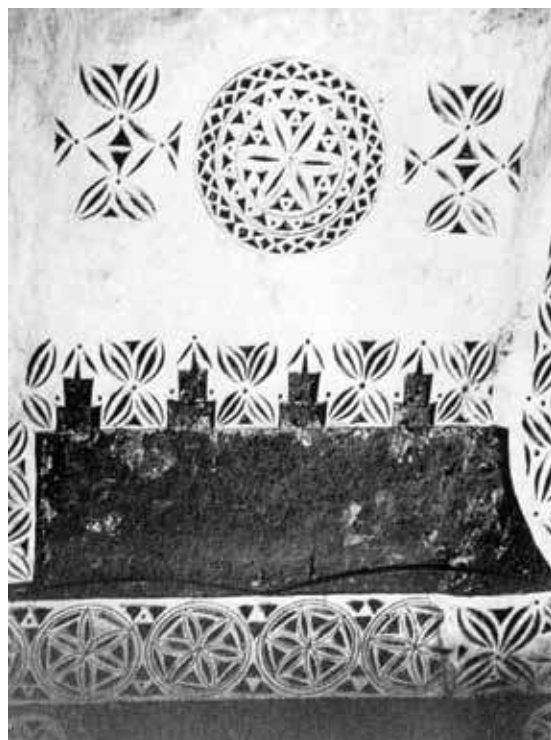
portion of clay in the mix, thus lessening the shrinkage and consequent cracking during drying, while maintaining sufficient clay to fully permeate the mix with its adhesive solidity and compression strength. The adding of sand and silt to the mix is known as “soil modification”. Najdi builders of course judged the effectiveness of soil modification by eye, but these days it is normal practice to find the optimum mix by what is known as linear shrinkage testing: a sample of the wet mix is packed into a shallow mould 60cm long, and its overall shrinkage once dry can then be measured.

Najdi builders generally found the right kind of building material by selecting their source deposit carefully. Wadi deposits usually contained a suitable proportion of clay, silty soil (*turāb*) and sand already mixed together. The silty soil absorbs less water than clay and, because the grains are impermeable, expansion does not take place on wetting. The sand grains, which do not absorb water, act as a filler: they are bound together by the sticky clay and add compression strength to the brick when dry. In some parts of the world sand is added, but in Najd it is not found necessary to do this, because there is sufficient sand occur-



The straw content of the mud mix helps to prevent erosion by rain, as can be seen here on the tops of parapet walls in the mosque at al-‘Udhaibāt.

Carved plaster decoration typical of southern Najd. The Briton Gerald de Gaury, who took this photograph in c.1935, described it as “like lace in mortar”.



Elaborate decoration on a typical old door from al-Qaṣīm, in central Najd.



Opposite The relatively simple embellishment of a door from the Riyadh area of southern Najd contrast with the more colourful treatment of doors by the craftsmen of al-Qaṣīm.

ring naturally in the soil. In general it has been found that a clay-and-silt content of between 20 per cent and 30 per cent is the right one for most types of adobe, depending on the other constituents of the mix. Soils are very variable and it is impossible to lay down a precise recipe for all localities. In the old days trial and error would reveal a good mix, but these days soil analysis and compression tests are the best basis for assessment.

Chopped wheat or barley straw (*tibn*, *Sha'īr*) would then be added. There is some debate as to why this is necessary. There is indeed a distinct disadvantage in adding any organic material at all to the adobe mix, because it attracts termite which will ultimately destroy the wall. However, in England studies on mud mixes for building have shown that a 1.5-2 per cent addition by dry weight of chopped straw increases the compressive and tensile strength of the mix when dry. The reason is probably purely physical: it acts as a mechanical binding agent and allows a wet mix to be applied with minimum slump. It also helps to prevent erosion by rain of the mud surface when dry, rather as the roots of plants help to prevent surface soil erosion.

But it is also thought that, if the mix is left to ferment before bricks are made, the fermentation produces lactic acids which make the bricks stronger and less absorbent, while the straw releases colloids which aid adhesiveness. It may be also that the straw helps to conduct moisture to the surface, helping the mud mass to dry at the same rate, so minimizing cracking. Animal dung is sometimes added too, and is thought to aid these processes. Extra straw is added to the mix if it is to be used for plastering the wall. This makes it easier to work and, once dry, the straw helps to throw rainwater off the surface of the wall so keeping the mud in place. These raw materials were mixed in a shallow



pit and water was added. Thorough mixing by trampling is vital, because all the sand and silt grains have to be separated into the adhesive clay mix. Squeezing by trampling achieves this more effectively than, for example, tumbling in a cement mixer. The mix could then be used immediately if bricks were to be made. Though it was thought best to leave it to “ferment” for several days or even weeks to obtain the best result, this was not done by careless builders.

Brick-making was done by pressing the mix into a brick-shaped wooden frame on a layer of straw on the ground, and removing the frame. One man can make between 200 and 500 bricks per day in this way, and about 3000 would be needed for a small house of about 60 square meters. Properly the bricks should then be left in the shade for one to two days to prevent the surface cracking which results from too-rapid shrinking. They were then left in the sun in rows to dry. After a day or so they would be turned onto their sides to complete the drying process.

If the mix was to be used directly for constructing a wall in continuous layers, fermentation of the mix was considered essential. Builders

agreed that the longer the mix was left to ferment in this way, the better the quality of the building material. If it was to be used for a fine mud plaster finish on the completed wall, it would be left for as long as possible. During the restoration of al-‘Udhaibāt the mix was left to ferment for up to three weeks, on the advice of both the Najdi master-builder ‘Abdullah bin Ḥāmid and the Egyptian consultant Professor Lamei (see Chapter 5), and the resulting material is very hard.

The bricks were then used to build up the external walls of the building, on top of a foundation and lower courses of roughly cut stone blocks. At the base the exterior walls might be very thick – a metre or more – especially in the case of large buildings. For example, the audience-hall of Sa‘ūd the Great (Imām of the First Saudi State AD 1803-14), one of the Salwā Palaces in Atturaif nearby, has a thickness of three mud bricks on the first floor, tapering to one mud brick on the upper storeys. This tapering construction was typical of all Najdi mud walls, and can be clearly seen in the ruins of Atturaif: for sound structural reasons, it was the external face of the wall which was battered, the internal face remaining vertical. Once the building

The new mosque at al-Badrī‘ah, seen here in 1937, was built on the opposite bank from the palaces. Its simplicity, comparable to that of the mosque at al-‘Udhaibāt, was characteristic of Najdi mosques generally.



was nearing completion, with decorative triangular ventilation apertures and lancets formed through the wall with stone slabs or timber supports as construction proceeded, the building would be plastered.

Stone was commonly used in Najdi buildings to provide a foundation, sometimes rising to a few feet above ground level. The stone courses provided a barrier to rising damp from the irrigated soil of the oasis and the often high water table within towns. This made sense, as the salt-rich groundwater rising into the mud causes major damage to the base of adobe walls. These courses were covered with mud plaster like the mud-brick superstructure, so that they were not usually visible. Internal walls were of less solid construction and were usually built either on the ground surface or on an adobe foundation.

Another major use of stone was to make columns and capitals. Limestone blocks were fashioned into drums which would then be laid one on another, bedded on mud mortar but not dowelled together. The stone capital carried the wooden beam which enabled the ceiling span of the room to be doubled. Columns were also used to construct the colonnades round the courtyard. The finished column would be covered with mud or white gypsum plaster. In a building of two storeys or more the column would be run continuously to the full height of the upper storey beams.

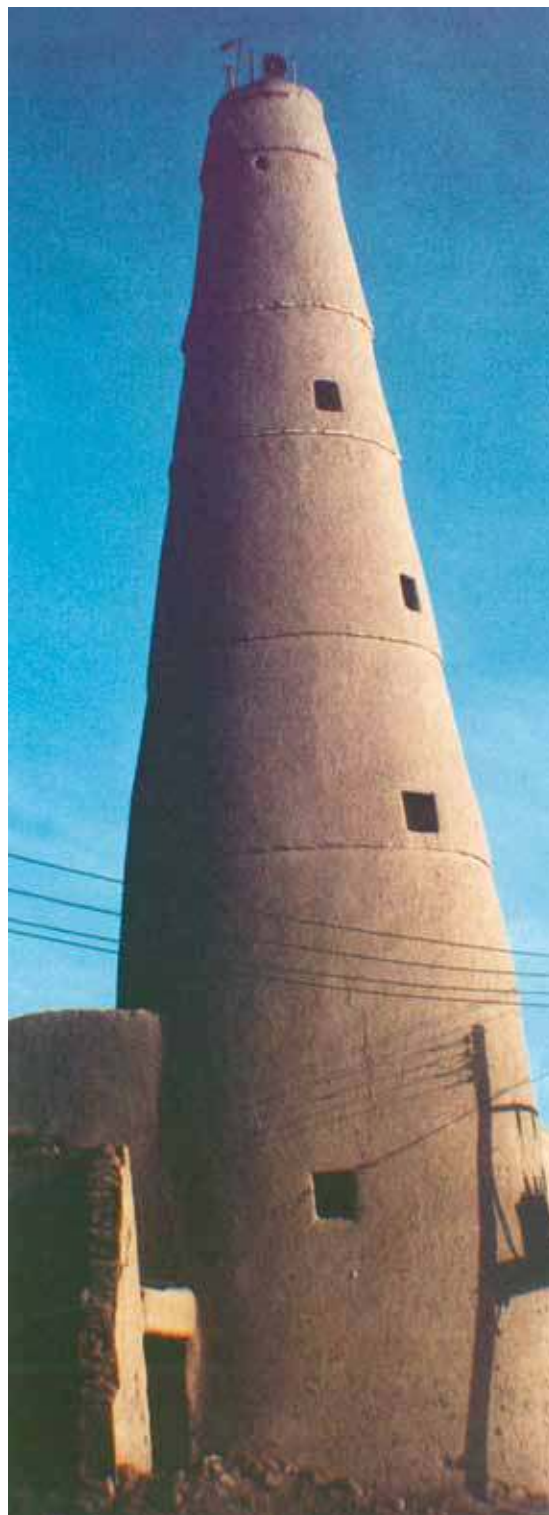
A lesser use of stone was in the construction of keel arches to make the arcades in mosques: here two slabs of stone would be leant together from the tops of adjacent column capitals, to form the apex of the arch where they met. The arcades of al-‘Udhaibāt’s mosque are a good example of this keel arch construction. This type of arch is the only one indigenous to Na-

The roofscape of the mud-built city of Ḥā’il in 1914.



Right The towns and villages of al-Qaṣīm in central Najd were remarkable for their tall, circular minarets and watchtowers. Only a few survive, today like this minaret in ‘Unaizah.

Opposite An old door, probably of al-Qaṣīm workmanship, is still in place next to the Palace of Fahd in Atturaif.



jdi style, spaces normally being spanned by trabeate methods, that is by columns or walls supporting horizontal beams. It is this use of timber beams and stone slabs which determines the trabeate style of Najdi architecture: it is an architecture of straight lines and cubic spaces, not of domes, vaults, arches and squinches.

Timber was used structurally to make ceilings and lintels. The wood was almost always tamarisk (*athl*), though palm trunks might occasionally be used for main bearer beams. Tamarisk is light, strong and tensile. It does not split easily, and branches and trunks grow to a sufficient length for use as joists. Joists would be laid close together to span a room, or in larger rooms to span across to a central column-supported beam. The maximum span was normally no more than three and a half meters. Stripped palm fronds were then laid over the joists, and a thick layer of rubble and mud laid on top of a scatter of loose palm leaves to form the floor above or the roof.

Tamarisk was used to make doors and window shutters which, in Najd, were the one building feature which was colourfully decorated, though lintels and cross-beams were also often decorated with patterns of scorched dots and some colour. The builders of ‘Unaizah in al-Qaṣīm were especially renowned for their decorative doors and shutters in intricate geometric designs. Because builders from al-Qaṣīm were much in demand in the adobe building boom in Riyadh before the early 1950s, doors and shutters of this kind can still be found in the markets of Riyadh and on some old buildings. However, the traditional style of Riyadh, its district of al-‘Ārid, and of southern Najd in general, was much sparer, with more bare wood showing, and this is the style that has been rightly adopted for the new doors and shutters of al-‘Udhaibāt..





This type of adobe or mud brick construction, with many local variations, was the universal method used in Najd for houses in the recent past. Indeed, it has a strong connection with Arab culture, for the word adobe is a Spanish word derived from the Arabic *al-ṭūb*, meaning brick. It passed into Spanish from Arab North Africa, and from Spanish into English via Mexico and the southern United States. However, there are other ways of building in mud: *pisé de terre* and cob, both of them also represented in Najd.

Pisé de terre is a method of constructing earth walls by ramming a layer of moist but not wet earth between braced shuttering boards. Its advantage is that because it is artificially compacted it can be used relatively dry, so lessening the shrinking and cracking that come with drying. It is the method refined in France by Cointeraux and which is till widespread in rural France and Morocco. There is no evidence for the method being in general use in Najd in recent decades, but it seems to have been commonplace in the early 19th century, for something like it is described in detail by a visitor. In the midsummer of 1819 the improbable figure of Captain George Froster Sadlier, an officer in the British army in India, arrived in the midst of the desolation of ad-Dir‘iyyah as some of its people were trying to rebuild it after its destruction by Ibrāhīm Pasha. He had been sent to interview Ibrāhīm on the Gulf coast. Having just missed him there, he was foiled again at various halts across Arabia as Ibrāhīm withdrew to the Ḥijāz. Sadlier eventually caught up with him at al-Madinah. In the process of this dogged pursuit he became the first European to cross Arabia from coast to coast – a quite unintended achievement, during the course of which he had plenty of opportunity to observe the way things were done in Najd. At ad-Dir‘iyyah he described a

method of building which seems to be very similar to *pisé de terre*:

The foundation of the walls was apparently built with large flat stones which are found in abundance in the hills to the north; these were strongly cemented with yellow earth, and of which latter material the upper part of the wall was composed; this earth is very adhesive, and found in abundance all over this part of Arabia; the greater part of the houses are usually built of it. The process of building is very simple. A pit is dug where this earth is expected to be found, and water poured in to mix into mortar, layers of which are formed of the breadth of the wall by means of a few planks made into the form of a long box; when one layer is completed and dry, another is added, and thus a house is constructed of three or even four storyes, the walls of which are one solid mass of the earth, which requires only the labour of the father and his children. Limestone is found near Deriah, but the scarcity of fuel precludes its being

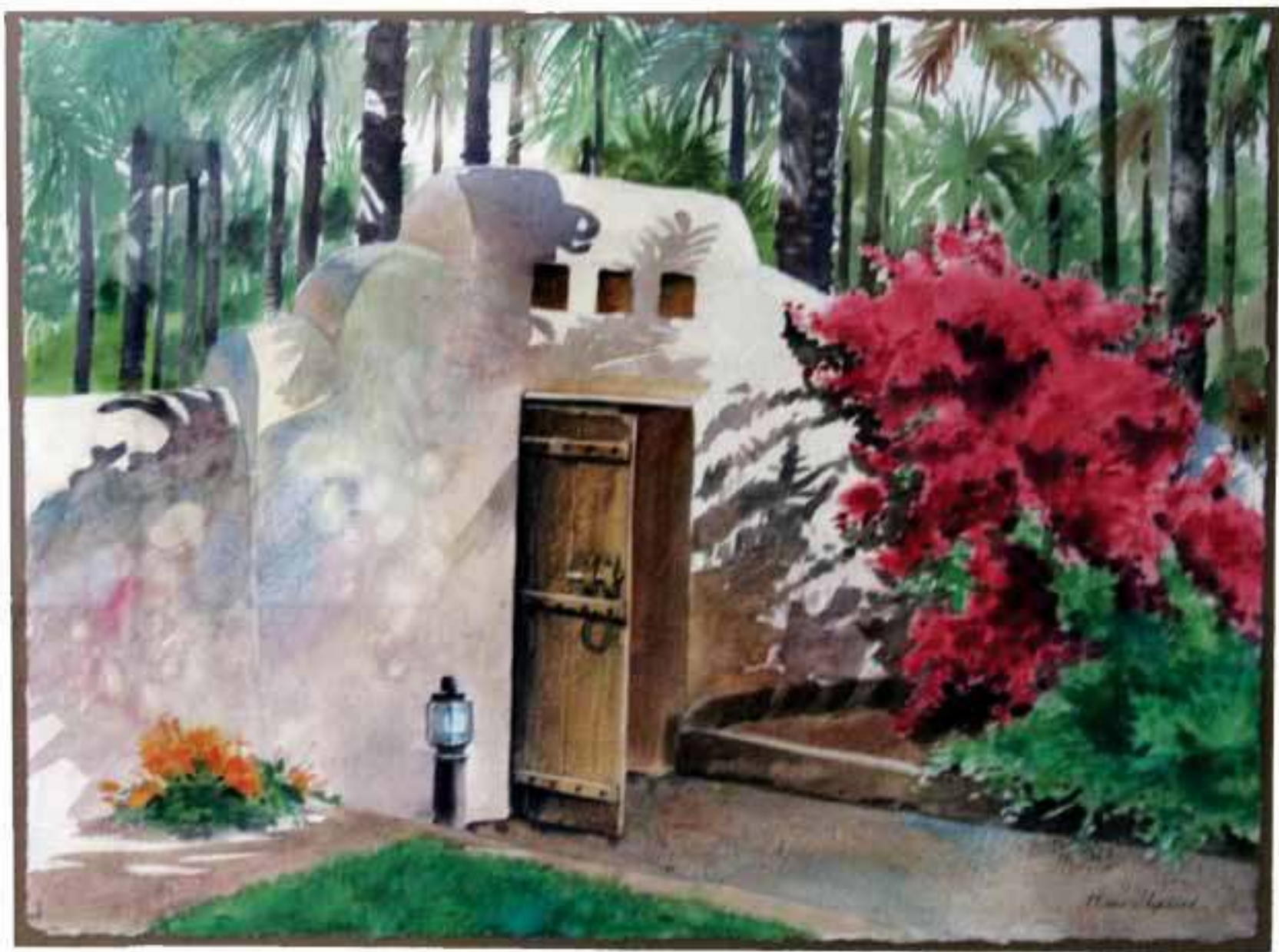
brought into use for building, although a sufficiency is procured for white-washing and sometimes for plastering.

The other method of using earth for building is known as “cob”. This method, still in use in, for example, Devon in south-west England, consists of building up the wall in layers without the use of shuttering. The mix needs to be wet enough not to need ramming, but self-supporting enough not to slump as it is placed in a layer on the wall, and a good admixture of chopped straw is used to help achieve this. Once built up to its full height the uneven surface is cut away to give a smooth-faced wall. This method of construction is still used in Wadi Ḥanīfah for Farm walls and can be seen at al-‘Udhaibāt. The only difference from the English method is that the layers are emphasized by the finishing rather than erased. Interestingly, this is the method in common use in ‘Asīr and Yemen for building house walls. The layered houses of ‘Asīr and Bīshah in Saudi Arabia, and of Sa’dah in Yemen, strongly recall the layered construction of the farm walls at al-‘Udhaibāt.



***Opposite* the typical cob or mud layer construction of houses in Najrān, south-west Saudi Arabia.**

***Left* Farm walls in al-‘Udhaibāt are built by the cob or mud-layer method.**



4

Adaptable Adobe

...there are two duties respecting national architecture whose importance it is impossible to overrate: the first, to render the architecture of the day, historical; and, the second, to preserve, as the most precious of inheritances, that of past ages.

John Ruskin, *The Seven Lamps of Architecture*,
Aphorism 27.

Opposite A door at Al-‘Udhaibāt.



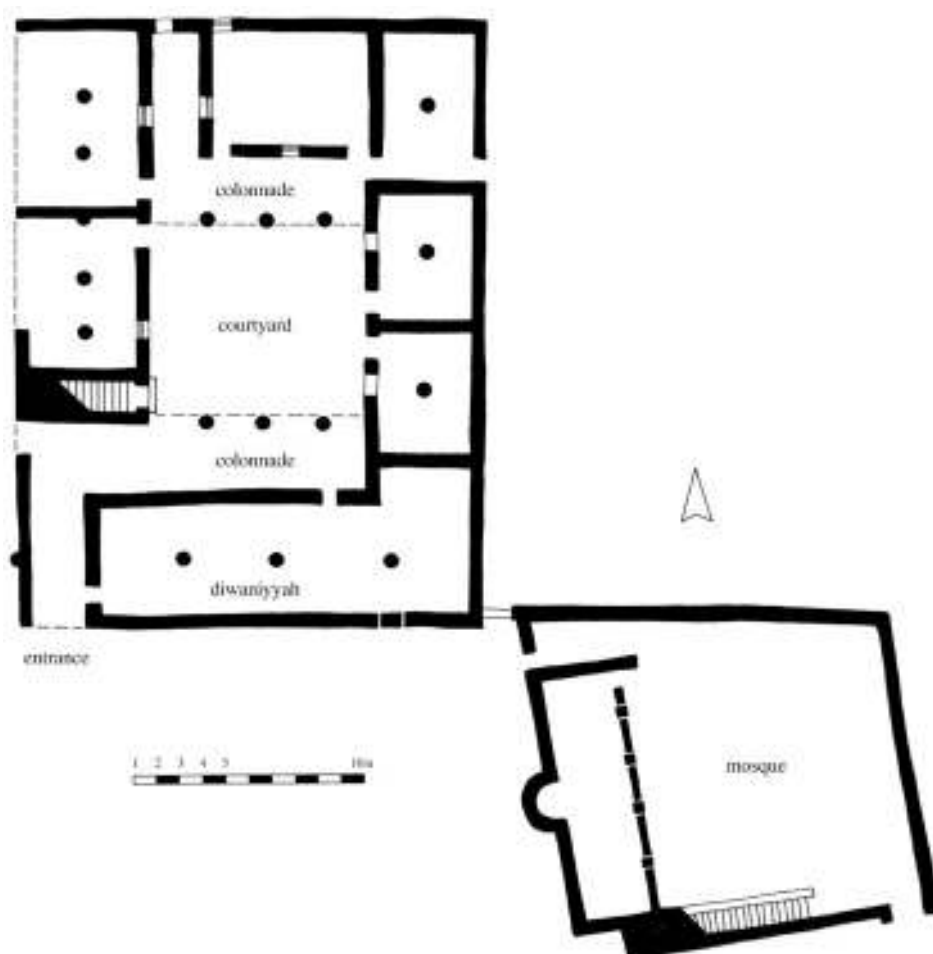
Prince Sulṭān acquires al-‘Udhaibāt

In 1986, Prince Sulṭān was interested in acquiring a farm. When he saw al-‘Udhaibāt he was immediately attracted to the farm and the house, although they were in need of much work. The farm at that time consisted mainly of date plantations in the southern part, while the northern two plots were not farmed at all. In this northern part only a small section had been cultivated before: a plot encircled by a mud wall and containing two old wells. Most of the northern side was fully accessible from Sha‘īb Ṣafār, with no protective walls, and it was being used by contractors as a garbage dump.

The caretaker was using part of the house for himself and for animals. The rest of the house was uninhabited and, as all structures of sun-dried mud would, had suffered badly from storms and erosion.

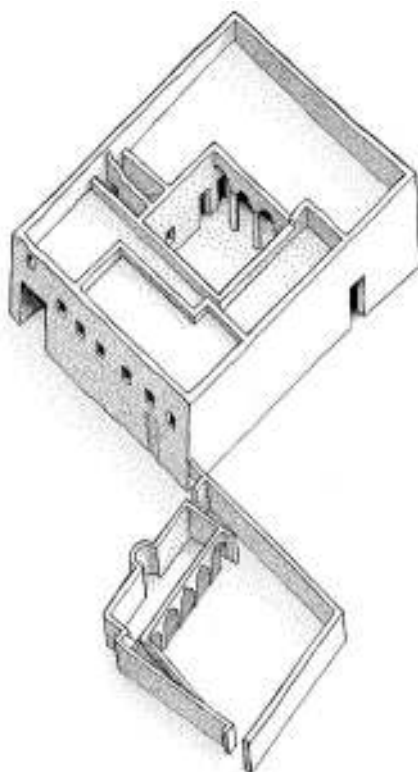
As its new owner, Prince Sulṭān decided at once that the farmhouse should be repaired and restored. A local builder who worked in adobe was engaged from ‘Irqah nearby. The animal enclosure which formed a substantial annex on the west side of the farmhouse and part of the western wall was demolished. However, after the work had proceeded for a while, its quality was judged to be too crude. The work was stopped while the next step was pondered.

It was then suggested that a conservation architect should be called into advise on methods of restoring the old farmhouse. With this in mind, Dr. Sāliḥ Lam‘ī was introduced to Prince Sulṭān. Professor Lamei is a distinguished Egyptian architect – winner of an Aga Khan Award for historic building restoration who is well – known for his expertise in building conservation in the Middle East. In the 1970s, Professor Lamei had designed and managed



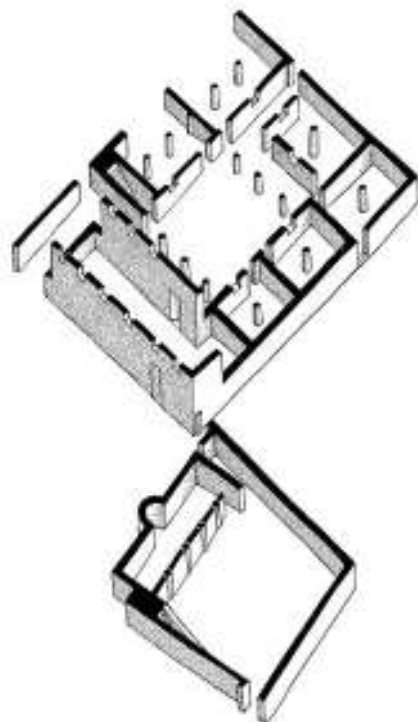
Plan of the farmhouse as surveyed before restoration, with the extension on the west side demolished.

Opposite The fountain in al -‘Uhaibāt garden.



Top Isometric drawing of house and mosque before restoration, with the west side of the house demolished.

Right Isometric drawing showing plan and column layout of the house and mosque before restoration, with the west side of the house demolished.



two mud building projects (the German Centre for Archeological Excavation in Aswan and the German centre in Luxor), and agreed to participate in this project. Kubilay Ali, a Muslim Turkish civil engineer with an international experience of project – managing large construction projects, was already on the Prince's staff, and was placed in charge of the work as project manager. As a first step, the building's existing condition was carefully recorded and detailed drawings were made of the structure.

The first idea was that the house should be restored and made into a showpiece of Najdi architecture for visitors but Prince Sulṭān had misgivings. Somehow such a place would be a frozen moment from the past. It would not be something living, with a use, a function and a life of change in an unfolding present. Uninhabited reconstructions can be dead places, and he did not want to create a museum piece, a mere replica of the past.

For, even if he did, which part of the past would he choose? Mud architecture has always been adapted through the centuries to changing uses. The 18th century palaces at Atturaif are notably different in mud mix, brick size, layout and function from early 20th century buildings on the same site and at Riyadh nearby. For example, they are taller, with thicker walls, integral long-drop privies, and more elaborate external decoration. So the Najdi builder has always felt a freedom to experiment with style and materials to adapt, improvise and improve. There is no simple, fossilized building form one can point to in the past and say; it was always just like that until the mid-20th century changed everything.

But there are *some* continuities in almost all Najdi houses: the courtyard layout; the thick adobe wall plastered in mud; stone foundations

for outer walls; stone column drums; the blank face to the public on the outer walls at ground floor level; the use of tamarisk (*athl*) wood for beams, joists, doors and shutters, often embellished with colourful decorative patterns; and geometric carved decoration in *juşş* (local, traditional gypsum plaster) in important rooms. All these features have an abiding functional or social purpose which it would be senseless to reject without good reasons for doing so.

A more creative course was therefore adopted. While respecting these constants of Najdi building as represented in the farmhouse, Prince Sulţān decided that his restoration project would create a mud house adapted to the needs of modern living. He would conduct a two-part experiment, involving himself personally in every stage of decision – making. The first part would be the process of evolving a traditional adobe house to suit modern needs. The second part would involve his family as well: they would move in, at least for part of the year, to experience at first hand, the business of living in an adobe house. This experience would be recorded and the results, including recommended adaptations and improvements, would be made available to Saudi architects and students with a view to appraising adobe's role as a building material for our time.

The Prince threw himself into the process with the enthusiasm of a man with a mission. Creating a beautiful place and imbuing it with its own distinctive spirit is an absorbing and fulfilling pastime. Every choice, however detailed, became a matter of importance to decide, until it almost seemed as if the process of debate and decision was more important than the reconstructed house. And, in a sense, this was true. The documentation of the restoration process is an important architectural case study, each stage of which will be presented

in the next chapter. And the plans to make the house and farm available for study to students of architecture and planning in the Kingdom's universities are already being implemented.



Adobes laid out to dry for the first attempt at restoration. These were much inferior in quality to those made later.



Early restoration efforts left much to be desired, not only in the quality of adobes but in techniques of building. This work, though of the same standard of construction as found locally in, for example, the houses rebuilt in the 1960s in Atturaif, was considered inadequate and removed. From now on the project was to be one of constant investigation and improvement of local techniques.

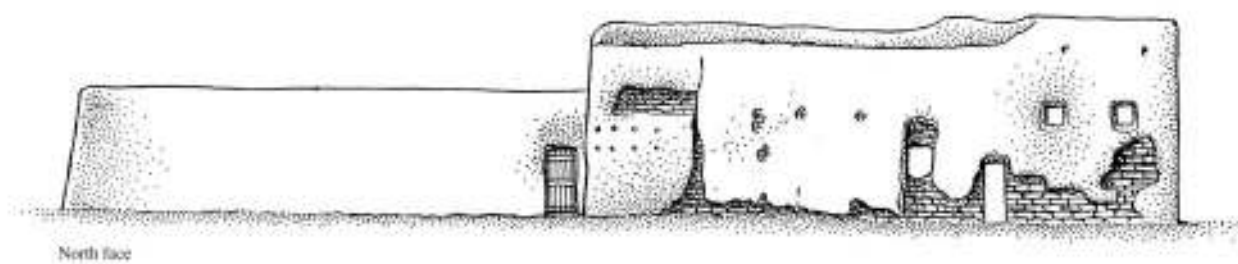
Thinking through the restoration process.

The road to the completed building was to be a tortuous one. Al-‘Udhaibāt Farm, as we see it today, is the result of a process of evolution marked by lengthy discussions as every option presented itself along the way.

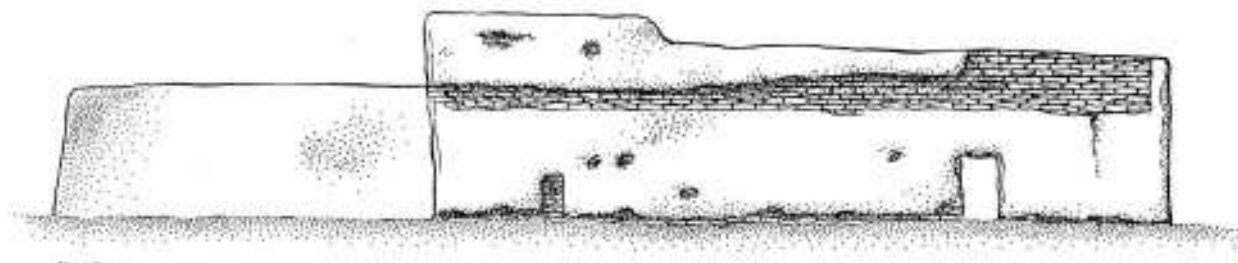
On all such projects there will always be two main areas of debate. The first concerns the line between restoration and reconstruction and where it is to be drawn. How much of a ruined wall, for example, should be retained before what is left is consolidated? Should one restore what is known to be missing, or leave well alone? If one decides to restore, how far should one go to restore the original? Should one make it look exactly like the original building, or should the difference between old and new be quite obvious to the viewer? If one takes the latter course, should the original materials be used, or will that just be confusing once weathering has taken place?

With mud-built structures these issues are greatly confused by the fugitive nature of the material. Such buildings naturally suffer from heavy rain and their use requires a commitment to constantly maintain them. If left unmaintained, a mud wall tends to subside with time into a shapeless, dusty heap - a heap which is hardly distinguishable from the ground on which the wall was raised, and which preserves no construction or design details, so telling little about the wall's original appearance except for its alignment. Even if an old wall is still standing, erosion, saline rising damp and termites will probably have weakened it beyond repair. So it is tempting, possibly even advisable, to rebuild old mud walls as new, and it is inevitable that “restored” structures take on the appearance of brand new buildings. Once restored,

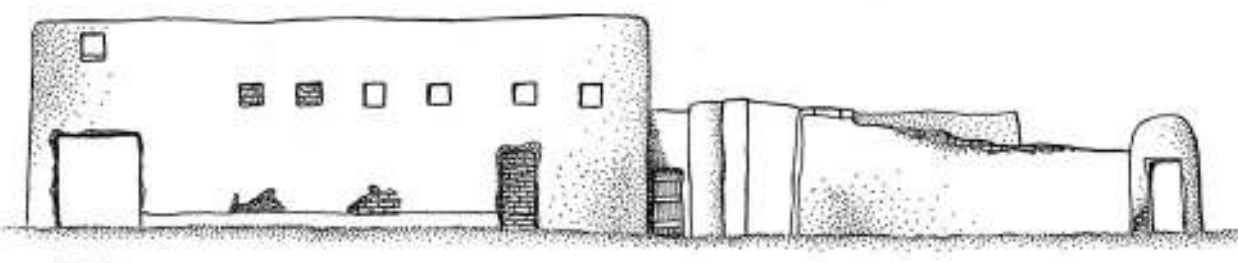
Opposite Elevations of each side of the house before restoration, with the west side demolished.



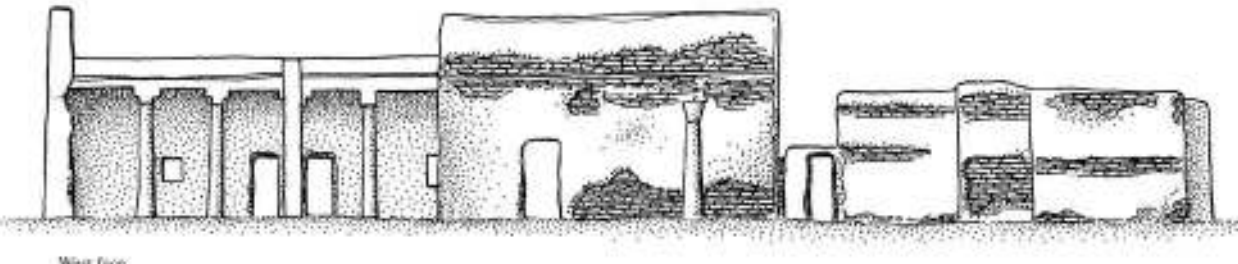
North face



East face



South face



West face





it is almost impossible to tell which part of a building is original, and which has been rebuilt or renovated.

The second area of debate is the line between acceptable and unacceptable modernization – never a clearly defined one. This discussion usually turns upon three basic issues. One focuses on the design of spaces themselves, and whether traditional spaces are adequate to serve modern needs. Another centers on materials and whether they can justifiably be improved by modern additives, or even replaced by modern alternatives which perform better. The third concerns the comfort and facilities which, in the modern world, we insist upon as necessities, but which to our forbears would have been beyond the dreams of luxury. As elsewhere in the world these luxuries in Saudi Arabia stem from advances in plumbing and energy supply,

and may be listed as running hot and cold water, drainage, lighting, air-conditioning, electrical power and communications.

As regards the first area of debate – the line between restoration and reconstruction – the Prince was naturally anxious to save as much as possible of the existing standing structure. It was on this basis that the project went ahead until, as we shall see, a site accident forced a rethink and, in effect, decided the issue. Thereafter the old walls were removed and rebuilt from their foundations in fresh materials and with their thickness increased.

As for the allocation and design of spaces, several small improvements have been introduced which enhance their utilization without spoiling their character. For example, some window apertures have been made at ground floor level, on the shady side of the house where the bedrooms are located, to allow views out to the delightful palm groves, and to increase interior light levels. A new mud wall protects the privacy of the garden outside these windows. Purists might debate the authenticity of having external windows at eye-level: in the past, especially in settlements, houses did not have windows at the ground floor level looking onto the street, to protect the occupants from prying eyes. But a glance at the picture of Princess Nūrah's house outside Riyadh in the 1930s will show that precisely such innovations were being made in the heyday of mud-building in the 1930s when ambitious attempts were being made to adapt it to more varied and contemporary uses.

Ideas for upgrading building materials and introducing modern ones were proposed by Professor Lamei and the project manager Kubilay Ali. These were discussed and examined, and Prince Sulṭān gave the traditional method the

Previous page The interiors at al-‘Udhaibāt combine traditional spaces with modern expectations of comfort.

Right the *wijār*, or coffee making hearth, in the *dīwāniyyah* prior to restoration.

Opposite the house of Amīrah Nūrah outside Riyadh, built in or shortly before 1935, was a new departure, with its windows facing outwards and with exterior courtyards.



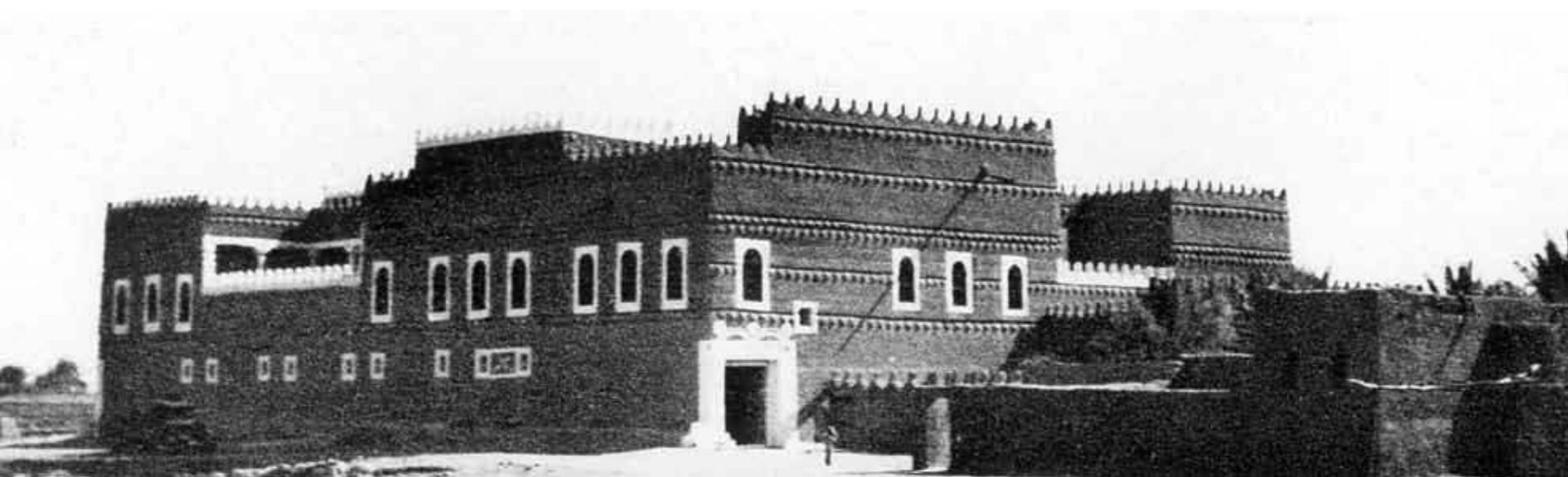
benefit of the doubt in cases where he felt it would adequately serve the purpose. Thus waterproof membranes and stone dowels between column drums were rejected, and termite barriers decided against, despite the retention of straw (which was however treated with an anti-termite agent) in the mud mix. In other cases, however, when convinced of the need, he decided in favour of modern materials and amenities, for example where impermeable wall and floor claddings were called for in wet areas.

As with traditional materials, so with traditional aerodynamics. It was decided that, if the courtyard house was to be honestly put through its paces, air-conditioning should not be installed. That this particular temptation has been resisted is a tribute to the rigour of the project.

By contrast, the decision was taken to install electricity and plumbing, as basic requirements of modern life. There are bathrooms, sanitation, drainage and kitchens with modern appliances. There are also fireplaces based on a traditional model in some of the rooms. Without these comforts, it was thought, the experiment in living in al-'Udhaibāt Farm would have been too spartan an exercise. It simply would not have had a chance of success, nor would it have been such an effective experiment in the adaptability of traditional adobe to modern living. Furthermore, modern drainage contributes greatly to building conservation, by removing a prime source of rising damp.

If traditional building is to have a future, it must be capable of adaptation. Although it will never be the permanent home of the Prince and his family, the house will be used, and its development will be on going. The experiment of living in it will be a real one, from which many lessons will be drawn for the future, as low-cost and low-energy housing once again becomes an issue.

Najdi building in the past has always been a vernacular architecture with no place for architects as we know them now. But today architects can actually advance traditional techniques by experimenting with materials and testing structural improvements—such as termite barriers, rain-proof roofs, surface treatments, wall-capping techniques, and the enhanced density and durability of mud bricks. The hope is that they will also be stimulated to new design work. No one who stands today in the newly built rooms of the farmhouse at al-'Udhaibāt can fail to be moved by the spaces, by the quality of the materials, by the grace and simplicity of the interior decoration, and by the harmonious interplay of light, colour and shadow. For those with a sense of history, the atmosphere engenders a feeling of peace and appropriateness which is almost tangible, and not to be had in modern buildings, whatever other virtues they may possess. Thus inspired, it is up to the new generation of Saudi architects to ensure a future for their indigenous building techniques.





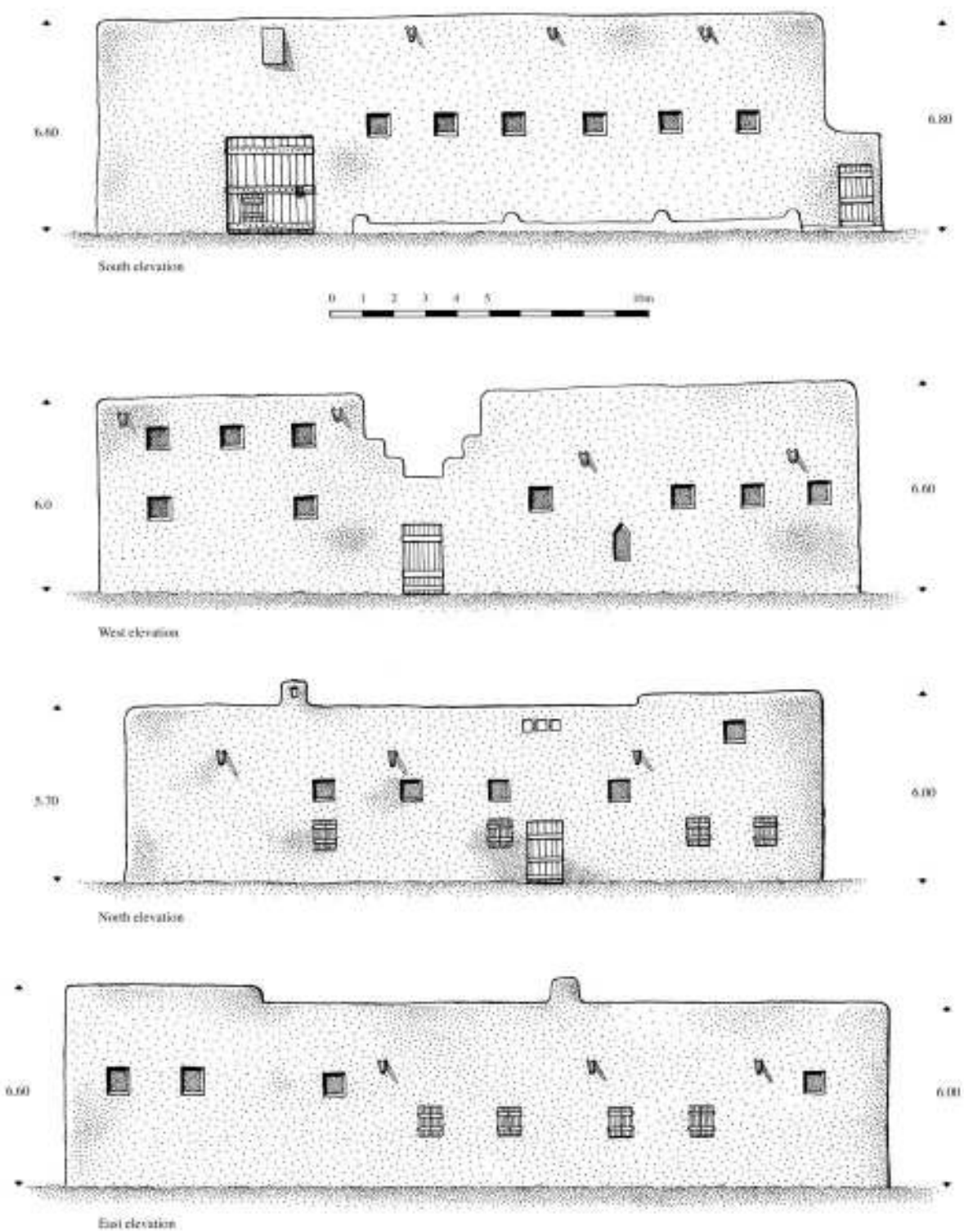
5

Restoring the Farmhouse

If ... local methods do not provide all that is needed in an age of change and activity, they are at any rate, though perhaps curiously, adapted to the physical conditions of the country; and an architect will lose nothing by studying them respectfully.

Ernest Richmond, Director of Public Buildings for Egypt, addressing the Royal Institute of British Architects, 1911.

Opposite The great well at al-‘Udhibāt and the farm house.



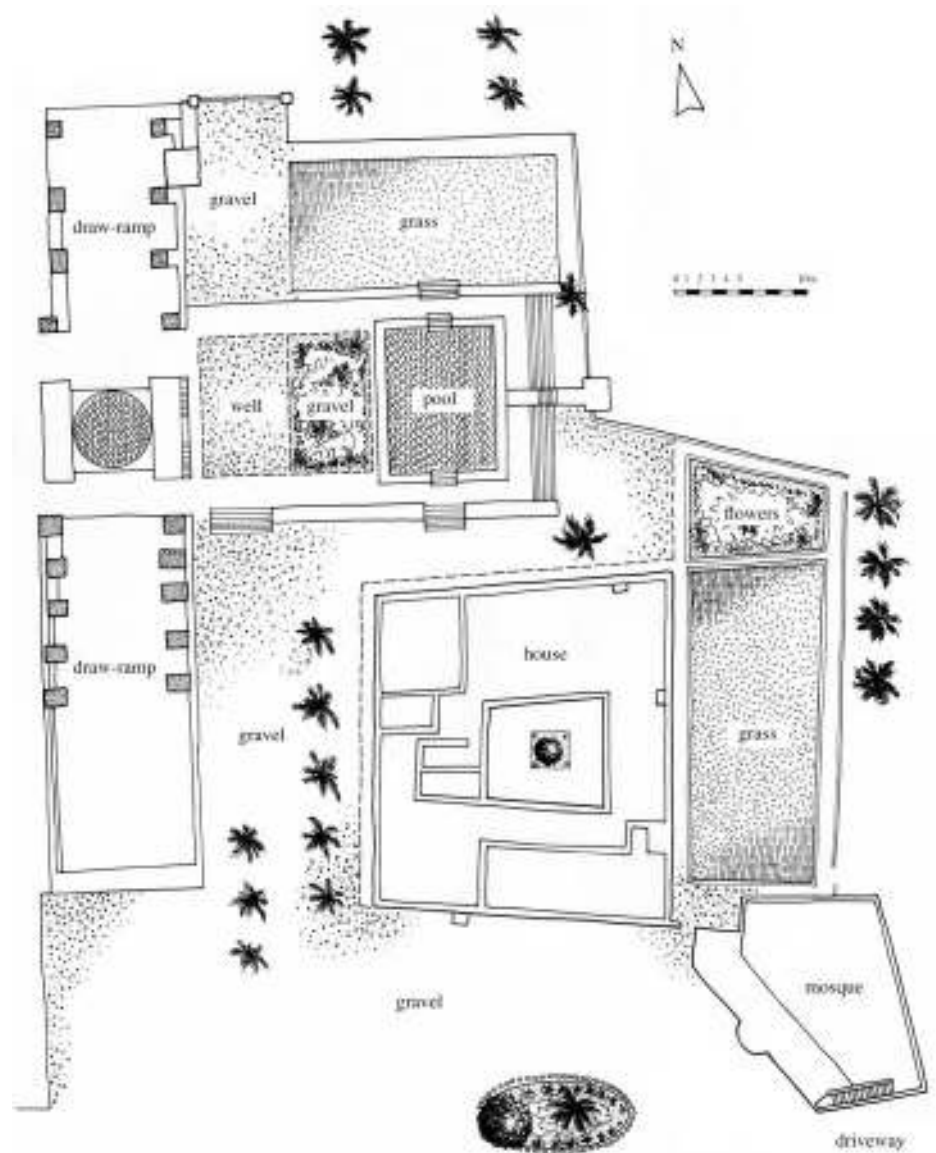
Elevations of each side of the houses as built.

The design begins

After the initial site survey, Professor Lamei was invited in January 1994 to carry out a design study for the complete restoration of the farmhouse. Four alternative schemes were considered, and by February 1994 these had been modified to produce Plan no. 5.

Plan no. 5 was used as basis for proceeding with the restoration, and the go ahead for construction was given in the summer of 1994. But it was always expected that things would change as the project proceeded. In the event, some quite sweeping changes were to be made. For example, the present dining room replaced a breakfast / kitchen area, and the kitchen occupies the area where a third bedroom was intended to be. Several door locations were changed, and windows added.

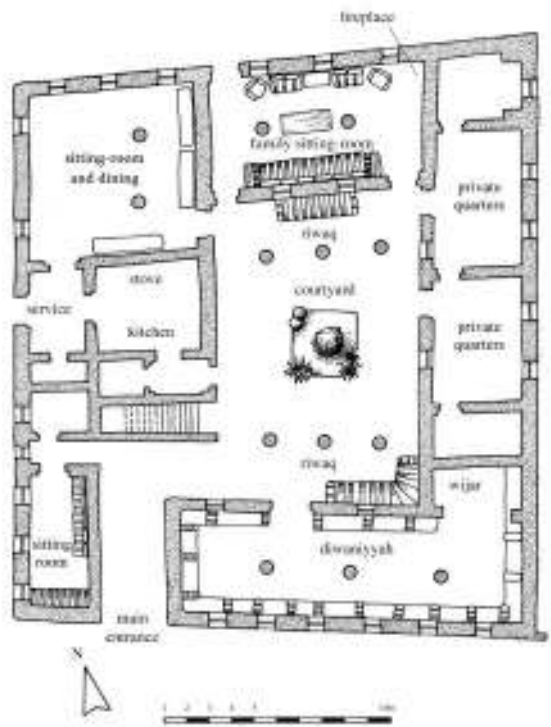
Such radical changes to the first agreed plan were possible for two reasons. First, the nature of mud as a “soft” building materials allows modifications to be made very easily. Secondly, the relationship between Prince Sulṭān and the project was governed less by the conventions of the modern relationship between a client and his architect, than by those of the traditional relationship between owner and master-builder. In this case, because the restoration was seeking not only to rediscover but even to improve upon traditional techniques, the master-builder part of the equation was composed of a triumvirate: Professor Lamei, who was to remain throughout the project as a consultant; Kubilay Ali as project manager; and an acknowledged master of Najdi building techniques, ‘Abdullah bin Ḥāmid, who was brought to the project in late 1994.



Site plan of the farmhouse, mosque and well.

‘Abdullah bin Ḥāmid, the master-builder.

Plan of the house as built.



‘Abdullah bin Ḥāmid, the master-builder.

Though it is a tradition of architecture without architects, large building projects in mud have always required the services of a master builder, rather along the lines of the master mason in mediaeval Europe. Master builders combined a high level of hands-on skills with the vision of an architect, and were used to problem-solving on site and adapting the building scheme as a project proceeded. Such master-builders were well-known figures in the towns of Najd and, indeed of the towns of Arabia as a whole, before the modern era. Two hundred years ago ad-Dir‘iyyah had its Ibn Hazam. In the 1920s and 1930s Ibn Muraikān presided over much of Riyadh’s early expansion in adobe, and Ibn Qabbā supervised the construction of Murabba’ Palace in 1936-8. The builders of al-Qaṣīm were particularly renowned.

‘Abdullah bin Ḥāmid is now more than eighty years old and has been working as an adobe builder since his childhood. He followed in the footsteps of his father, who was drawn to Riyadh by the good prospects for builders during the adobe boom of the 1930s. As the demand for traditional adobe dried up and prosperity increased, most builders of the old school either went out of business or gave up their arduous livelihood. Ibn Ḥāmid, however, held out, and in recent years his skills began to find a new role in adobe restoration projects. He worked on the restoration of the Murabba’ Palace and the Maṣmak Fortress in Riyadh. As the years have gone by, he has become one of the very last of his kind. He was known to Prince Sulṭān because he had already renovated four wells for him in the old and new farm plots.

Assembling the ingredients

The first task, as always, was to find a source of earth suitable for building, and a good source in Wadi Ḥanīfah, known to the people of ad-Dir'iyyah, was quickly located. As the source was some kilometers away, the earth had to be trucked to the site and so, strictly speaking, the material was not free of charge.

Next, a considerable amount of straw had to be obtained, as for basic bricks chopped straw was to be added in the proportion of 50 kilograms per cubic meter of earth.

The third ingredient was desert sand which, on Professor Lamei's advice, which he based on his experience of clays used in Egypt, was to be added to the mix as one part sand to three parts of wadi earth by weight.

Testing the earth

Natural wadi clay-bearing earth is a variable substance, and it is advisable to test it thoroughly before use. As well as pure clay it contains varying amounts of particulate material, ranging from silt to fine and coarse sand. Fibrous organic material and soluble chemicals such as salts may also be present. All these factors affect its properties as a building material. Five types of tests were carried out on the wadi earth intended for use at al-'Udhaibāt.

First, *sedimentation analysis* established the amount and fineness of the clay and other particles, and their mechanical properties. A measured sample was taken and soaked in water, allowing the constituents to separate out and settle in a column.

Next, *sieve analysis* using fine sieves of different meshes was used to determine the coarse and fine sand constituents of the soil. Third, X-



Earth is brought from the wadi and mixed with straw.



Straw is brought in bales and sawn into short lengths before being chopped with spades.

Master-builder ‘Abdullah bin Ḥāmid working on the interior gypsum during the rebuilding.



Master-builder ‘Abdullah bin Ḥāmid checking the materials for the mud bricks.



Master-builder ‘Abdullah bin Ḥāmid working on the walls during the rebuilding.



ray *diffraction* refined the results of sedimentation analysis by determining the types of clay present, such as attapulgite and kaolinite. These are fine clay binders. This test also determines the types of other constituents such as sand, silt, and fibrous organic materials. Together these tests help to determine whether the addition of extra sand to the mix is necessary.

Fourth, testing for the liquid and plastic limits of the material determined what are known as the *Atterberg limits* of the material. That is, how much water the earth mix will absorb before subsidence takes place, and how little water needs to be added to make it plastic.

Last, *chemical analysis* (the addition of diagnostic chemicals to the clay) determined the presence of detrimental constituents such as chlorites, sulphates and soluble salts.

Washing the earth

Salt is always a problematic constituent of local building materials in the arid lands, and it was assumed to be widespread in the Wadi Ḥanīfah soils. It was therefore thought advisable to wash the wadi earth brought to the site. To do this, block-lined pits were built, dry earth was sieved into them through a 1mm mesh, and then they were filled with water. The salt rose to the top and flowed out through the overflow. However, this proved to be an impractical process because the time needed for the earth residue to dry out would have jeopardized the February 1995 deadline set for the completion of restoration.

It would have been advisable to wash the sand also, but this was dispensed with for the same reason. Only time will tell whether the salt content of its building materials is sufficient to cause damage to the farmhouse’s fabric.

Treating the straw

Wheat straw was supplied in bundles. First the bundles were sawn up and then the straw was chopped with spades to prepare it for mixing. It is the straw in the mud mix which, as a cellulose material, attracts ground termites into the wall structure and so allows them to reach the roof timbers. This is a major cause of deterioration in earth buildings. The straw was therefore sprayed with Dursban 4TC, a specific anti-termite treatment, before being used in the mix.

Making foundation bricks

One of the first tasks of the restoration was to consolidate the foundations of the existing walls. Special, more durable bricks were required for this, and it was proposed to experiment with the addition of natural hydraulic lime to the mud mix.

Natural hydraulic lime is found locally: it contains a maximum of 70 per cent calcium oxide mixed with 30 per cent clay, and was reckoned to be a more binding ingredient for mud bricks than commercially available lime, which contains up to 90 per cent calcium oxide plus magnesium oxide.

The natural hydraulic lime is broken up into small chunks which are put into water. They then heat up and disintegrate. However, the lime was not found to go powdery enough to resolidify. Several samples were nonetheless made of mud bricks using this hydraulic lime to earth at 1:6 to 1:4 by weight, mixed with chopped straw and sand. These were tested by hand and by soaking with water, and were found to be too crumbly and weak for use. This experiment was then abandoned. Whether these bricks failed owing to the nature of the hydraulic lime or the addition of desert sand, which was later found



What look like leaks are in fact the tunnels termites make to reach the organic matter of the roof.

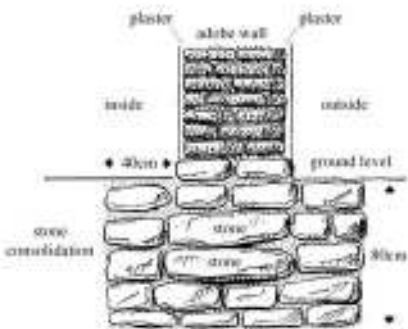


Adding lime to the mud mix to make experimental foundation bricks.

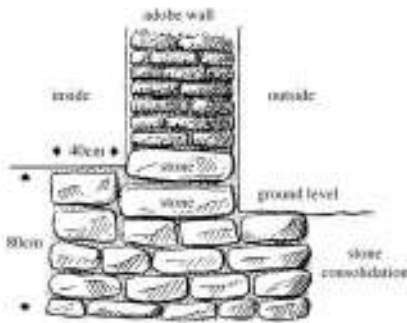


Spraying straw with Dursban 4TC, selected as the right treatment for the straw and the *athl* timbers because it is a relatively mild chemical which does the job with the minimum toxicity necessary.

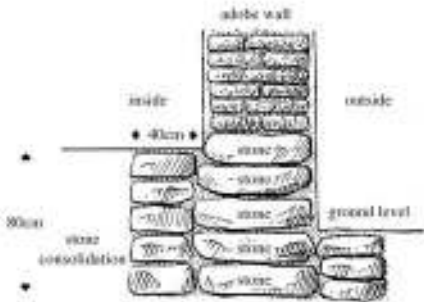
Cross-section of new foundation along north and west external walls.



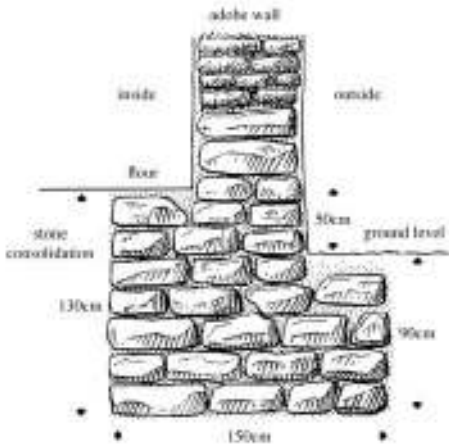
Cross-section of new foundation along east wall.



Cross-section of new foundation along south wall.



Cross-section of new foundation to east wall of *dīwāniyyah*.



to be unnecessary, was not established. But as a general principle, there is no advantage to be had in using either lime or cement as a stabilizer unless mechanical compression is applied to the block, to reduce the air-void ratio.

The next experimental foundation bricks were made by substituting sulphate-resisting cement for the hydraulic lime, at 5 per cent or 1:20 by weight of cement to earth, again without compression. These were found to be more satisfactory, but were used only for the initial consolidation of the foundations of the internal walls. Later on, when it was decided to rebuild all walls, stone foundations were laid for the external walls. For new internal walls mud bricks were used which did not contain any cement, since by that time the experiments in adding cement, lime and sand to mud bricks had been completely abandoned.

Consolidating old wall foundations

At first it was planned to keep the existing walls and columns where they were, simply restoring them *in situ*. But because the new roof of the farmhouse was to be thicker and therefore heavier than the old one, so imposing a greater load on the walls and columns, it was decided that their foundations should be reinforced.

So old external walls were first strengthened with stonework foundations, whilst the old internal walls were strengthened with cement added bricks. The original farmhouse, as it emerged, had not been at all carefully built: not only were there no foundations, but the wall bases were not built of stone as was usual. Hence foundations had to be built from scratch beneath the existing walls. This was carried out to a depth of one meter, in the same way as under-pinning: in alternate strips first, returning to fill in the intermediate strips later.

Column consolidation

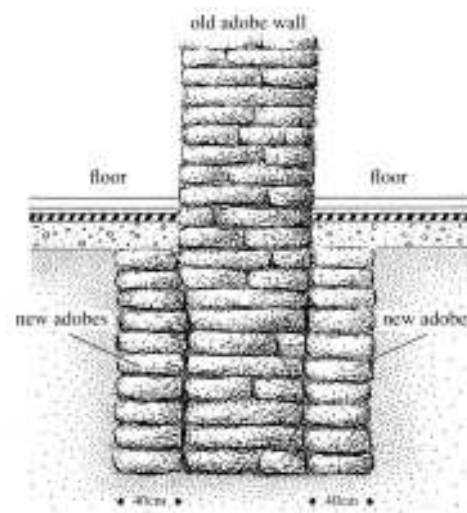
Like the walls, existing columns were not built on proper foundations. The base column drum had simply been laid about 70cm below ground level. Concrete (without reinforcement) was considered to be the most appropriate material for consolidating column foundations because it could be poured in place without disturbing the columns, and would bond itself to the stonework as it solidified. To insert proper foundations, the ceiling structure first had to be propped up, and lateral props were put in place at two levels to keep the columns steady. Then holes were dug around the column bases to a depth of one meter. Grooves were cut in the column bases to provide a key, and a conical steel form was placed around the base in the hole. Then concrete was poured into the form. Column bases were the only locations where modern concrete was used in the restoration.

As the project proceeded, some columns, for example those in the bedrooms, were removed completely, and some were moved to new locations. This was done either to create larger spaces or to conform with the new arrangement of rooms. For new column locations new columns had to be built using existing stone column drums. Two structural improvements were proposed for these new columns: stone dowels inserted in the centre to add greater lateral stability, and a waterproof floor membrane fixed as a flashing to the base of the column. Neither of these recommendations was taken up, as they were felt to be too much of a departure from traditional methods.

The columns in the *dīwāniyyah* were the tallest, at nearly 6 metres high. When the front (south) wall of the farmhouse collapsed, these columns collapsed too. They were rebuilt using original stones. Later, towards the end of the project



Cutting in new stone foundations to existing walls.



Foundation consolidation of old mud walls.



Reinforcing an existing wall with a new adobe foundation.

Columns laterally braced.



Ceilings were propped while holes were dug to the column foundations.



The columns of the *dīwāniyyah* were restored as existing before they were completely rebuilt.



in December 1995, cracks developed over the surface plastering of these. This cracking could have been caused by shrinkage of the plaster. More seriously, it could have been caused either by minor buckling of the columns or by internal cracks in some of the stone drums sustained at the time of their collapse. It was decided to renew the columns with wider stone drums, again without dowelling.

Making traditional adobes

The correct recipe for the mud mix was arrived at through the intervention of Ibn Ḥāmid. Ibn Ḥāmid had already insisted that it was unnecessary to add extra sand to the mix, on the grounds that there was already enough sand in the local wadi earth. But his advice had gone unheeded.

Instead the mix with added sand was being used in late 1994 for the first trial plastering of the existing walls. The result was obviously unsatisfactory: sand particles, not bonding adequately with the clay, were rubbing off the dried surface. The problem seemed to be one of too much sand. New sieve tests and chemical analyses were conducted on the mix, and confirmed this opinion. Ibn Ḥāmid was vindicated: the local wadi clay was found to contain about 35 per cent of sand already, within the limits of 30-45 per cent recommended by published tests.

From then on, Ibn Ḥāmid was placed in charge of the brick-making and plastering. For plain bricks, 50 kilos of chopped straw were added to one cubic metre of local wadi earth, and mixed with 1 to 1.5 cubic metres of water. Potable water was used, because the farm water is slightly saline. For the mud plaster, the amount of straw was doubled.

To make the mud mix, first the dry ingredients are mixed together thoroughly.

Trampling the mud mix by foot has to be done in small batches. The dry mix can be seen in the background.



Turning the mud mix with a mechanical digger.



Pressing the mud mix into wooden brick moulds.



A depression is made in the mix, as if mixing sand and cement, and water is added. At first mixing was done by trampling but then, because this was very laborious for the quantities required, a mechanical digger was used. Over the first two or three days more water would be added and the digger would churn the mix again. Then the mixture was left to ferment for two to three weeks, being sprayed at intervals to keep it moist.

During this extended fermentation period the straw disintegrates and a slight chemical reaction takes place, the precise nature of which is still obscure and needs to be analysed. The fermented mix turns a blackish-grey colour like manure, with a distinctive smell indicating good fermentation, but on application and drying it reverts to its natural buff colour.

After two to three weeks the mixture is ready for brick-making or plastering. To make bricks, it is pressed into a brick mould on a straw-strewn flat place. The mould is removed and the brick is left to dry, first in the shade for a day or two to reduce the risk of surface cracking, and then in the sun, being turned onto its side after a day. A day or two later the bricks can be stacked in a way that allows air to circulate around each one.

To make the plaster more durable and rain-resistant, the use of Protim 23 WR as an additive to the mix was considered, but the decision was taken to stay with the traditional material.

Testing the mud bricks

To determine the durability of a mud brick a simple, commonsense test is used: you take a brick and immerse it in water, and time how long it takes to dissolve. A reliable mud brick will take at least 17 minutes. The bricks made

for al-‘Udhaibāt took 25 minutes—a very good result. Interestingly, the bricks made with added cement for the initial foundation consolidation of old walls took about the same length of time, calling into question the real value of adding cement without compaction of the block. (Carefully made, mechanically compacted earth blocks stabilized with 4–6 per cent cement have been found to last for at least five years immersed in water.)

The other essential test is to determine the compressive strength of the brick. This is a bench test carried out under laboratory conditions. A vertical column of the dried mud sample is squeezed between two plates until it collapses. The pressure is measured in newtons per mm^2 (1 newton per mm^2 is the approximate equivalent of 10 kilograms per square centimeter).

The compression test showed that the mud mix proposed for al-‘Udhaibāt registered 4.89 newtons per mm^2 when dry. This is a good rating for a sun-dried brick. It compares with 1.59 newtons per mm^2 for termite-ridden old bricks, to 2.05 newtons per mm^2 for termite-free old mud bricks from the same site. The care taken in the manufacture of the bricks is therefore a very significant factor in the durability of adobe buildings, and helps to explain why so many of the old buildings of Atturaif are still with us after some 200 years.

As a comparison, solid concrete test cubes register between 30 and 40 newtons per mm^2 , and therefore are up to eight times stronger than the adobe used at al-‘Udhaibāt. There is of course no need for that level of compression strength in building houses: one might turn this comparison on its head and say instead that if the compression strength of adobe is sufficient, then concrete is eight times stronger than necessary for house-building purposes.



Lifting the brick mould from the new brick.



The brick moulds used on site measured 8 x 20 x 40cm. Their corners were chamfered to provide extra “key” for the mud mortar during building, and to ease the removal of the mould from the brick—a refinement added during the project.

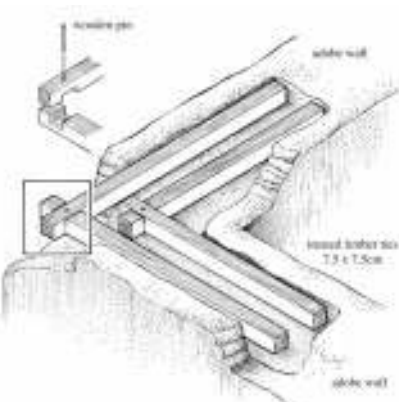


Bricks are dried flat for a while before being turned on their sides, to ensure even drying throughout. Differential rates of drying will cause extra cracking. Once sufficiently dry they are stacked with plenty of air circulating, so that drying can continue.

Rebuilding The west side: the quality of the new construction contrasts strongly with the old.



Right The west side under construction, joining onto the existing walls of the old house.



Above Treated timber ties set into wall corners.

The west side of the house ready for rebuilding, with the animal enclosure demolished.



The west side completed and plastered.



Restoring the old walls

Once sufficient bricks and mud mortar were ready, the restoration work above the foundations could begin. All the walls needed repair, and some new ones were to be built to make bathrooms. The old extension for animals on the west side of the building had been demolished, and the western side of the house had to be largely rebuilt from scratch. Most of the door and window locations were changed, involving filling in old openings and creating new ones. In the *dīwāniyyah* the window locations were retained, but two were added on the middle level on the east wall, greatly increasing the light level during the day and allowing a pleasant view into the palm gardens.

The proposed new roof

All buildings of sun-dried mud are vulnerable to rainfall, and it is the roof which plays the chief part in preserving the building from deterioration. Flat roofs are vulnerable whatever the materials they are made from. Being made of rubble and mud, the flat roofs of Najd are especially so.

From the start the roof of the farmhouse was to be renewed completely, including the timbers, which were heavily infested with termites. Proposals for a new roof were put forward which were intended to help to overcome some of the problems of Najdi flat roofs, in particular termites and water penetration.

The first proposed new roof structure specified a layer of concrete with screed on top, with a bitumastic damp-proof membrane of polyethylene sheets. Above the DP membrane was to be a thermal insulating layer of extruded polystyrene. The concrete was specified as “traditional” concrete, that is a lime concrete com-

posed of aggregate, clay, lime, pulverized fly ashes or fired clay brick dust. The “traditional screed” was to be the same, without the aggregate and clay, but with added straw. This was rejected by Prince Sulṭān because he felt that the traditional mud roof should be made to the highest standard and tested.

The second proposed roof structure replaced the thermal layer of extruded polystyrene with a layer of mud brick, and proposed a terracotta gutter around the edge of the roof to prevent erosion by run-off water. A DP membrane and polyethylene sheets were still included. Lead sheet lining was proposed for the wooden water spouts.

The third proposal was basically the same as the second one, with the addition of a termite barrier along the top of wall and steel angles to take the ends of the joists. The steel plate and angles were first tried in the garden seating area and, because they were visible from below, Prince Sulṭān had vetoed their use both here and in the farmhouse.

However, the plate and angles could easily be concealed in a future scheme, and some solution to the termite problem will have to be found. The termites are ground termites which are reluctant to across a gap; the steel plate could be masked by the use of stones rather than mud.

A version of the second roof scheme, without the steel plate and angles, but with the DP membrane of polyethylene sheeting, was begun. However, when part of the roof had been laid, Prince Sulṭān noticed the polythene membrane, rejected the bitumen alternative proposed, and instructed that the roof should be re-made in purely traditional style, under Ibn Hāmid’s supervision.



The restoration gathers pace, on the northern side of the house: old walls are patched, new openings are made and the new roof has been begun. The new roof structure is bearing on the repaired old walls and columns.



The west side nearing completion: the men are hauling up stone bearers for the dining-room girders.

Athl timbers being prepared for use. Behind can be seen the new western extension abutting the old farmhouse.



Dressing *athl* timbers with the Dursban 4TC tank and the un-restored mosque in the background.



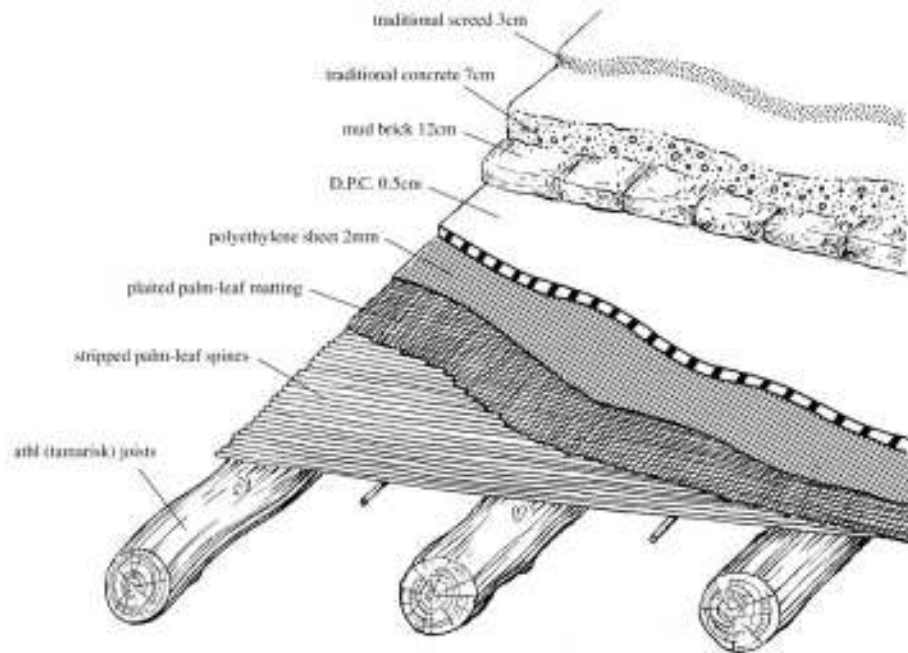
Roof timbers

The first step in making the roof is to procure the timbers for the joists and composite girders on which they bear. *Athl* is an abundant tree in all the farming districts of Najd, but the problem when building a large house is to find trees with branches and trunks of sufficient length and straightness. It is the length of the average *athl* joist which has to a large extent determined the size of rooms in Najdi houses: generally a 3.5-meter span is the most that can be allowed for. During adobe building booms of the past, such as around 1800 or in the 1920s and 1930s shortages of this local building timber have become acute.

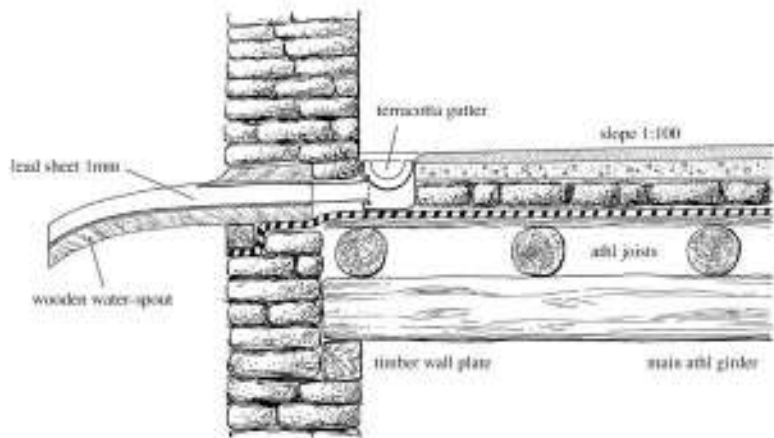
These days, however, *athl* trees have had plenty of time to recover and, indeed, forests have been planted on a large scale as wind-breaks and dune stabilizers. Nonetheless, the standards for al-‘Udhaibāt Farm were exacting: only the straightest and thickest would suffice. The most challenging requirement was for the spans of 5 meters planned for the dining-room, and 4.5 metres for the bedrooms. In the end, good sources were found in some farms at al-Muzāḥimiyyah on the road to Makkah, and in al-Kharj to the south of Riyadh.

The local people say that the best time to cut *athl* timber is in winter, during December and January, when the trees are thought to have minimum water absorption owing to the cool weather. Cutting them at this time, they say, reduces the amount of cracking and warping which occurs during drying. On this project there has not been the opportunity to test this theory. The humidity of the *athl* wood cut before December 1994 was measured, and found to be a relatively high 55 per cent or more. Normally a good seasoned timber for construction should not contain more than

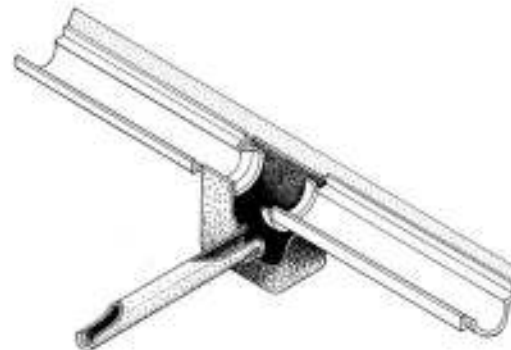
Left The second proposed roof structure, as built in part, but later rejected.



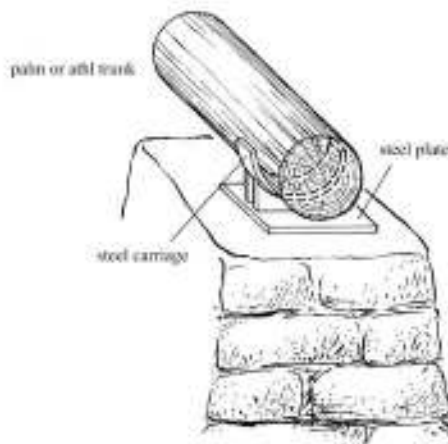
Far left The second proposed roof structure in section.



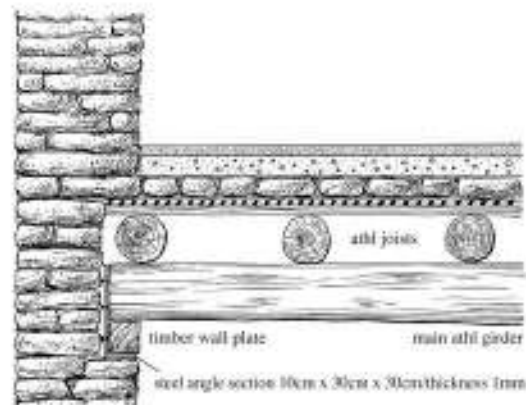
Left Isometric view of gutter and water-spout.



Left The third proposed roof structure in section.



Far left Possible termite barrier for beam (as used at first in shade structure for garden seating area).



Dressing *athl* timbers with an adze.



The largest possible *athl* timbers were obtained for the girders, some of which would have to span 5 metres.



Athl timbers being immersed in Dursban 4TC as a protection against termite attack.



Opposite A traditional skill taught on site: plaiting palm leaf mats for the roof.

8-10 per cent moisture. However, the pressure of the building schedule did not allow the proper drying of the timbers for al-‘Udhaibāt.

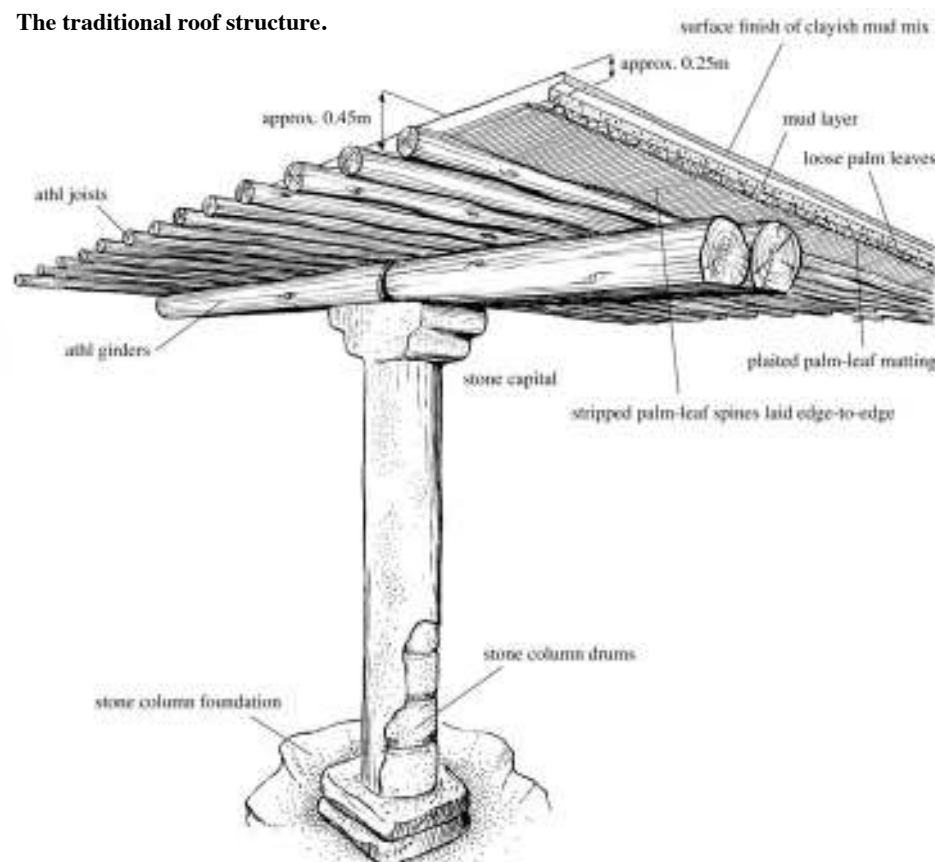
Having obtained the timbers, the next step was to cut them to length, trim them and strip off any loose bark. Then, like the straw, they were treated against termite attack with Dursban 4TC. Once treated, the ends of the timbers where they sit on the walls were painted with bitumen.

The application of bitumen gave rise to mould growing on the ends of the *athl* joists. The reason for this was the high level of humidity within the timbers. This became apparent when the old walls were demolished after building the new ceilings. Luckily the mould dried after a while and was cleaned off while the ends were exposed. However, as a general principle it is not advisable to apply bitumen in this way on *athl* timber when it is unseasoned and when its humidity is high. It is better to wait until the timber is completely dry before fixing it.

The roof as built

The first step in making the roof is to position the main girders along the centre of the room from column capital to column capital or wall. For most rooms the girders consist of two tamarisk beams each with a diameter of more than 25cm laid side-by-side, but in larger rooms three are laid. The under-side of each beam is cut and trimmed to a flat surface to help it to sit on the column capitals, and so that it can be decorated later. The beams are tied together with rope. Then the joists were laid, centred 35-40cm apart, on a course of stone work laid to the top of the wall to spread the load and to help defeat the termites. Next, palm frond spines were stripped of their leaves and laid neatly next to each other over the joists.



The traditional roof structure.

The problem here was to fix them tightly together. The obvious solution seemed to be to nail them to the joists, but the team felt strongly that iron nails should not be used in the building. A new technique was invented instead, which involved using a palm-leaf spine as a cross-member located parallel to and in between the joists, and tying it to the other spines with cord. This was supposed to be a temporary device to keep the spines in place until the rest of the roof was laid. But the visual effect is pleasant, and it was decided to leave them in place.

Meanwhile someone had to be found who could plait palm leaf to make mats. This used to be a very common skill in Saudi Arabia, but it has inevitably died with the passing of the older generation. It was thought that someone would have to be brought from Egypt until one of the Pakistani workmen on site showed that he was master of the art. In an interesting example of how quickly some ancient skills can be revived, he taught the others to do it too, and all the mats for the roof were plaited on site.

The next layer, on top of the mats, is a scatter of loose palm leaves, which forms the base of the thick mud layer. The mud layer is poured to a depth of 15-17cm. It is trampled in thoroughly, and left to dry for a minimum of three or four days. The function of the loose palm leaves is unclear, but it may provide a degree of tensility to the mud layer in case of slight shifting or bending of the roof structure over time, and it may possibly help insulation and breathing of the roof structure.

When the mud layer is thoroughly dry, a mud screed is laid on top. The mud is the same as that used for plastering—that is, there is a double amount of straw in the mix. The screed is compacted with a roller, and allowed to dry until cracks appear. These are filled with clay dust, and refilled until they stop appearing.

Draining the roof

Roofs of this type are very solid. They serve as a floor for outdoor living during summer nights, and are too thick to allow water penetration even after heavy storms. In the wadi beds, the dry compacted clay and silt is very resistant to water penetration, and this is part of the reason why such huge volumes of water rush down them after rain: the water is hardly absorbed by the ground surface. It is the same with the Najdi mud roof.

The first test of the new roof at al-‘Udhaibāt came with two weeks of continuous and intense rainfall in December 1995. Only minor leaks were observed. They occurred during the early days of the rain, and did not last for long. When weather permitted, some clay powder was worked into the areas where the leaks had occurred.



The roof structure: joists seen in position from below.

This page, left to right from top.

- *Athl* girders are bedded into place and tied together on top of column capitals; then joist with bitumen-treated ends are laid on them.
- A stone bearer for one of the dining-room girders embedded in the wall.
- The roof structure: joists seen in position from above.
- Trimming palm leaf spines to lay over the joists.
- Plaiting a palm leaf mat for the roof.



Facing page, left to right from top.

- Palm leaf spines are laid carefully on the joist.
- As palm leaf spines are laid, they are tied in place with string. The next stage is to put down a layer of palm leaf matting.
- Laying the wrong roof: the polythene membrane and layer of adobe visible here were not used in the final version of the roof as specified by Ibn Hāmid.
- Laying the wrong roof: mud being laid on top of adobe.
- Ibn Hāmid and workmen trample the roof mud. A thin mud screed is placed on top of this as the final layer seals the roof.
- Ibn Hāmid supervises the laying of the final roof: on top of the palm leaf matting goes a layer of loose palm leaves, and then a thick layer of mud – brought up to the roof by crane – is laid.







Builders at work on the north wall of the dining room clerestory.

The real test came in March 1996 when, on the evening of the 23rd, torrential rain-the heaviest ever recorded in Riyadh-caused havoc throughout the capital area. Within a few hours 23.4mm of rain had fallen, accompanied by heavy Ḥā'il. All the underpasses along the city highways and all low-lying areas were flooded. Modern concrete building facades sustained damage where fly-screens were ripped apart. Windows were broken and plasterwork damaged. Cars were dented by hailstones and their windscreens smashed.

Wadi Ḥanīfah and Sha'īb Ṣafār were flooded to a depth of about three metres, and the farm was totally cut off for twenty-four hours. The flood ripped up sections of the road along the Wadi, creating potholes and demolishing structures in its path. The scene resembled the aftermath of a heavy artillery bombardment. Cars and buses unlucky enough to have been caught in the Wadi when the flooding began were swept away, hitting adjacent walls and capsizing onto their sides.

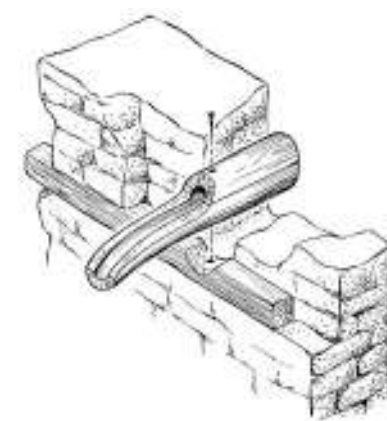
Incredibly, the farmhouse withstood the ferocity of the driving rain and hail and gusting winds. The plastering on the north and west elevations was affected, and some leaks could be seen on the wall surfaces. Most of the leaking was in fact through the north- and west-facing windows which were partly open at the time of the storm. Some water penetrated window apertures even though the windows were closed, the wind forcing it through the gap between the frame and the glazing. In just a few places minor leaks could be seen down the walls, apparently having come through the joint between the roof and its parapet.

The internal wall surfaces damaged by the leaks were repaired within a few days after the storm. It was also decided to improve the inter-

section of the roof and parapet wall by cutting a groove, inserting stone slabs as reinforcement, and replastering.

Even after moderate rainfall run-off water of course erodes the outflows and creates channels in the surface. If left unmaintained these will eventually let water through into the interior of the building and, ultimately, cause progressive collapse of the structure. However, simple annual maintenance avoids this problem. Rapid and effective run-off is important, for standing water will find a way through even a concrete slab. Hence careful arrangement of the slope of the roof is vital: this is done at the mud screed stage, as the roof timbers beneath are laid perfectly flat.

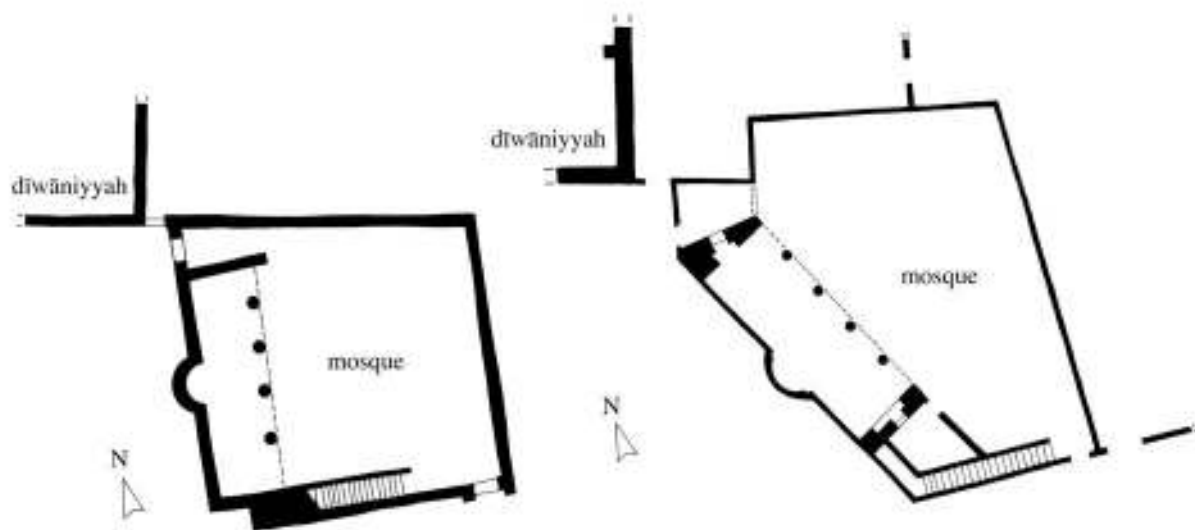
The run-off water has to be directed to water spouts through the parapet wall, and there has to be a sufficient number of these openings to deal with the maximum expected flooding of the roof, to prevent water building up. Water spouts are made of *athl* wood, sawn in half lengthways with a channel gouged out. They are set into the wall, and fixed firmly to a wooden cross member within the wall so that they cannot be displaced by a torrential flow of water. The part of the spout set within the parapet wall has an inverse piece of similar timber fixed on top as a cover, to form a tube. Stone slabs are built around the inlets of each water spout, both onto the roof surface as well as into the wall itself, to prevent erosion. Large stone pieces were also fixed over water spouts within the parapet itself as a counterweight where the parapet is low, above the *dīwāniyyah* and dining-room roofs. The spouts have to be set at a good slope so as not to slow the water down, and they have to be long in order to throw the water well clear of the base of the outside wall. If this is not done, erosion will soon appear on the wall beneath the spout.



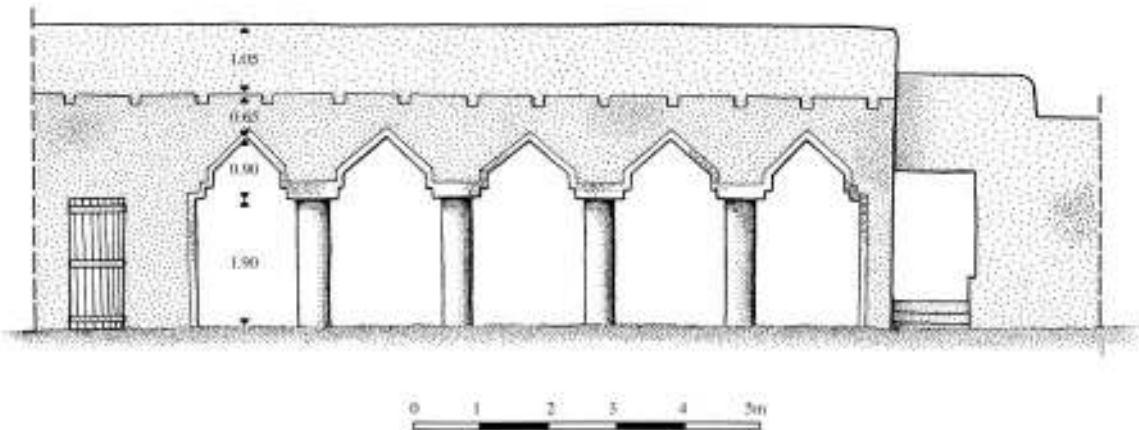
Isometric view of a water-spout.

Right The original mosque and its alignment.

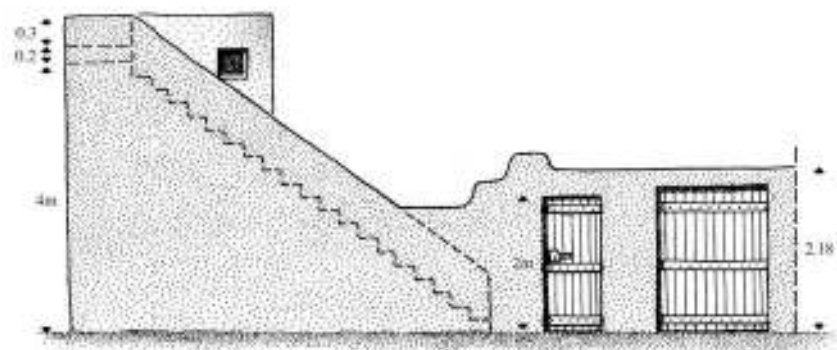
Far right The rebuilt mosque and its new, correct alignment.



Elevation of mosque arcade from the courtyard or *ṣaḥn*.



South elevation of the mosque, showing the stairway to the roof for the call to prayer.



For the same reason, It is important to prevent the rain from splashing upwards on to the wall from the ground, and this is the reason why it was decided to surround the house with a coarse gravel to prevent splashing.

The mosque

The mosque at al-‘Udhaibāt was an integral part of the scheme of the original farmhouse, reflecting the late King Faiṣal’s piety. With its keel arches, simple *miḥrāb* (niche marking the *qiblah* or direction of prayer towards Makkah), and *ṣaḥn* or unroofed enclosure, the mosque exhibited the complete simplicity considered a necessary accompaniment to worship in all Najdi mosques. These typical features were represented here on a charming domestic scale.

While it was regarded as essential to preserve the mosque, there was one fundamental problem: the *qiblah* was found to be inaccurately represented by the old mosque as it stood. It was actually misdirected by some 32° to the north of the proper angle.

Modern Muslims are of course in a position to align their mosque with total exactitude, and naturally insist on doing so. So here the restorers were presented with an interesting dilemma: whether to restore the mosque as it stood, being true to the state of affairs at the time that it was built, or to re-align it accurately while faithfully preserving its form.

Initially a compromise was tried. The old *qiblah* wall was restored in *situ* while, behind it, a new *qiblah* wall was built facing in the correct direction. Building proceeded like this for a while. In the end, however, it was decided that the exercise was rather artificial.



The original mosque before rebuilding.



Correcting the *qiblah* (direction of prayer to Makkah) without changing the incorrect alignment of the original mosque, seen to the right, involved building the correct one inside the original one. In the end it was decided to demolish the original, incorrect one.



The new keel arches of the mosque under construction.

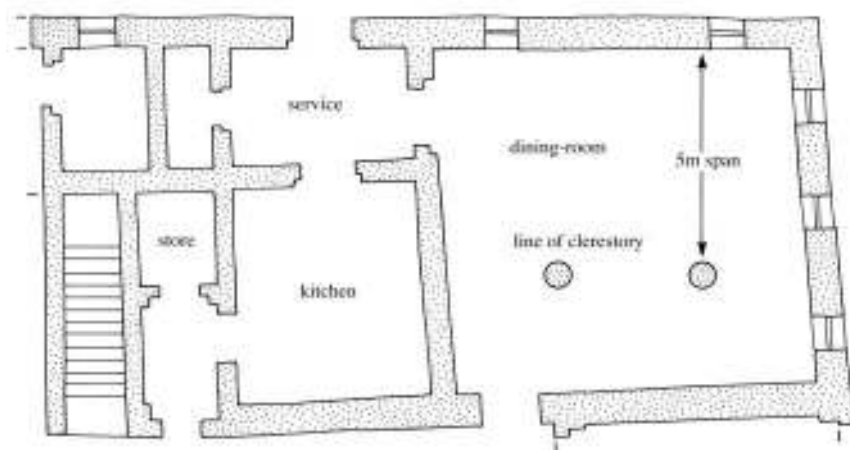


The finished exterior of the new mosque, complete but awaiting longer waterspouts.

Following page The mosque seen from inside the *īwān* or arcade and the *mihrab*.







Plan of the dining-room and kitchen area.

Opposite The clerestory of the dining-room completed, with the kitchen chimney in front.

The consensus was that a mosque, of all buildings should not incorporate any deception however well-intentioned they might be. The mosque was rebuilt from scratch on the correct alignment, but in its original style, and so became the first part of the farmhouse to be entirely rebuilt rather than restored.

The dining-room and its roof

Until late 1994 the north-west corner of the farmhouse was designated as a kitchen area. At that point Prince Sulṭān realised that the finished house would afford a uniquely atmospheric opportunity for entertaining and providing the hospitality expected of a Saudi and, as a result, for promoting this experiment in adobe. A spacious dining area would be needed, easily accessible from the kitchen. The plans were changed so that this corner was now to be the dining-room, and the kitchen was moved to the middle of the west side of the courtyard.

Until this point the roof of the farmhouse was on the same level everywhere except for that above the tall *dīwāniyyah*, which functions as the main reception room for guests. It was decided to raise the roof level of the dining-room also. The height was increased to form a clerestory with three new window openings – an innovative feature for a Najdi building, but one which in fact feels entirely in keeping with the architecture.

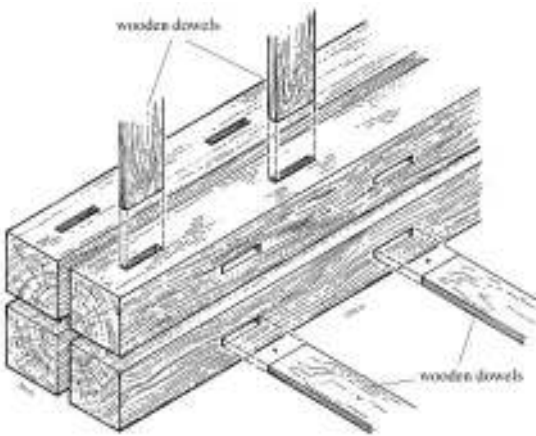
The main challenge in creating a grand space for the dining-room was presented by the 5-meter spaces to be spanned. Normally the problem would have been solved by putting in extra columns, but Prince Sulṭān was anxious not to clutter the floor space. Thick tamarisk beams of the necessary length would have been found, despite 4 meters being the maximum ever previously spanned. Finding such timbers was not easy and the work was held



The dining-room clerestory seen from outside during construction, with one of the 5m *athl* girders in place.



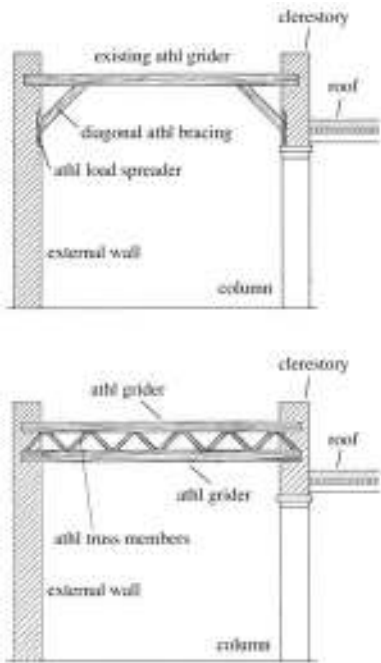
This dining-room ceiling: the split-level construction to create the clerestory makes for an imposing Najdi interior.



Above Proposed *athl* composite girder of double thickness.

Right Proposed timber truss structure for girder.

Above right Proposed diagonal bracing to traditional girder.



up until they were available. When they did arrive it was thought that they would need extra reinforcement. Three solutions were proposed: an *athl* composite girder of double thickness, a timber truss structure *athl* or a standard composite girder with diagonal bracing at each end.

At first, the idea of diagonal bracing was accepted. However, it was decided first to test whether the thick tamarisk trunks might be up to the job. They were therefore tested in place before adding the bracing. To carry out the load test, ten bags of cement (500 kilograms or half a tonne) were placed at the centre of each girder, and the props lowered by a few centimeters. The beams were monitored carefully for a week and no movement was observed.

This on-site load test demonstrated that the structure was safe, and that the diagonal bracing would be unnecessary. Since the roof of the dining room and the *dīwāniyyah* are higher than the general roof area, and neither is accessible without the ladder, they consequently will not have to cope with the live loads imposed by groups of people walking or sitting on them, unlike the main roof area.

The *dīwāniyyah* collapses

By January 1995 the roof was complete except for those section over the dining-room and the *dīwāniyyah*, which were higher. Because of the height of the walls these two areas presented potential structural problems, but these had been solved in the dining-room by the complete rebuilding in new materials of the west wall. In the *dīwāniyyah* consolidation of the foundations had been completed, but the original walls were retained. The old plaster had been removed from the walls in preparation for patching and replastering. The southern wall had two 45 x 45cm niches carved into it. Like all the other existing walls, it was not especially well built, being only 45cm thick with its plaster coating and a mere 30cm thick without it—rather thin for a wall 6 meters high. It was honeycombed with termites, and removing the old plaster would have weakened it somewhat. On the other hand, the roof had not yet been put in place and so it was not yet loaded.

The roof structure, had it been in place, might have provided some lateral stability to the top of the wall. However, there was no warning of the accident when it came, and it was not the top but the base of the wall which gave way. The workmen had just started the new plastering. They had wetted the wall and were working from the top when, suddenly, a whole section of the wall collapsed inwards, easily knocking over the *dīwāniyyah* columns which, in the absence of a roof structure, were still freestanding. Tragically one of the workmen was fatally injured.

From restoration to rebuilding

The collapse of the *dīwāniyyah* was a psychological turning-point in the project. Up till now the aim had been to complete the farmhouse by the month of Ramaḍān, in the second half



The men are building the *farmah*, or peep-hole, above the main gate, at exactly the point where the new construction of the west extension adjoins the original adobe construction of the *dīwāniyyah* and the rest of the house, with its old plaster stripped off.



The south wall of the *dīwāniyyah* after the collapse, which demolished the rebuilt columns too.



Laying new stone foundations for the new *dīwāniyyah* walls. The columns have been rebuilt as before, but they were later found to be too slender and rebuilt once again, thicker and stronger.



The *dīwāniyyah* has been completely rebuilt in new, superior adobes, while rebuilding of the eastern side of the house goes ahead. The walls have been increased from 45cm to 75cm in thickness.





Preparing to rebuild: scaffolding props the roof of the colonnade and of the *dīwāniyyah*, while the old north wall of the *dīwāniyyah* has been demolished to be rebuilt from scratch in new materials.



New walls rebuilt: a view over the courtyard shows the walls built as new, ready for plastering.



of February 1995. With this setback the pressure was taken off, and time taken to ponder the question of the safety of the other walls. If disaster had struck once it could strike again. It had to be conceded that the stability of the old, repaired walls could not be guaranteed. Therefore neither the safety of the workforce nor that of the future occupants of the structure could be assured. The only course available was to demolish and rebuild the walls in new materials.

This decision changed the nature of the project. Hitherto it had been a restoration exercise; now it became a rebuilding, with the greater scope for experimentation and improvement which that entailed.

Because most of the new roof was already in place, the entire roof structure had to be propped up section by section as the rebuilding of the walls proceeded beneath it. One radical decision was taken immediately: to increase the thickness of the walls from the original 45cm to 75cm. Not only has this improved the structural strength of the building, but it has almost doubled its thermal mass, so improving its passive efficiency. It has also imparted a feeling of solidity to the structure which greatly enhances the atmosphere of the place. The decision to rebuild has given us an experimental prototype of exceptional quality, in exchange for a standard restored Najdi building.

It is arguable whether at this point the opportunity should have been taken to add still more improvements to the structure of the walls. For example, a damp-proof course and a termite barrier could have been added at the base of the wall. A waterproof capping to the tops of the parapets could also have been added, perhaps in baked brick. But these are perhaps experiments which can be carried out on the next adobe project.

Treating wall surfaces

Although additives to the mud mix were avoided, it was decided to use a water-repellent agent on the finished wall and roof surfaces of the farmhouse. Over the years, experimenters have concluded that there is only one protective substance which works satisfactorily on mud, and that is ethyl silicate. This permeates the outer surface of the plaster, filling the pores with a silica gel which slowly evaporates, polymerizing the clay platelets so that they bond together. The wall surface remains permeable to water while being water-repellent, so enhancing the durability of the mud surface. The wall can still “breathe”, because the new surface allows moisture to pass through the structure. Another advantage is that it soaks into the wall surface by degrees: it does not create a sudden interface with the core of the wall, which would be vulnerable to falling away.

Ethyl silicate 40, in the form of Silester ZLS, was recommended for this project. In solution with ethyl alcohol this has been found to be a particularly effective treatment for mud buildings. However, ethyl alcohol is unobtainable in the Kingdom, and so another solution had to be found.

Sanotec Befix is a mineral-based, water-soluble alternative to ethyl silicate. Like ethyl silicate it is water-repellent. But it is fully biodegradable, leaving no harmful residues, and the treatment needs to be repeated at intervals. In a sense, therefore, it fulfils a condition of acceptable conservation treatment that it should be reversible. However, while Sanotec Befix was known to be an effective treatment for stone and concrete, it had never before been tested on mud.



Laying continuous timber ties within new walls.



The rough coat of plaster over the west door shows clearly the “fingering”, or *shub’ah*, which is carried out to provide “key” for the smooth mud plaster coat.

***On pp. 160, 161* The smooth final coat of mud plaster.**

Samples of the mud mix were sent to the Sanotec laboratory in Austria, and tests confirmed that Befix P was the most suitable treatment for al-‘Udhaibāt. Time will tell how effective it is. The first storms in December 1995 proved that it does not completely prevent erosion of the parapet tops by the mechanical action of water; on the other hand the damage to the parapets was not at all serious. However, the torrential rains in March 1996 damaged the mud plaster surfaces on the northern and western elevations of the farmhouse, wells and garden walls where Sanotec was applied.





The sun catches a carved gypsum niche.



The very fine *wijār*, or coffee making hearth, in the *dīwāniyyah*. Ibn Hāmid's signature may just be seen across the top of the niche on the left.



Ibn Hāmid tidies up a pattern (in the kitchen) which has been applied to the *juṣṣ* by stencil and then painted.



Previous page The sun catches part of a carved gypsum frieze.

The Sanotec solution was also used on the flat roof surface. Once again, the roof has proved remarkably resistant to the heavy rains, but what the contribution of the Sanotec treatment has been to this effect is impossible to say.

For the farm walls, which are built of cob layers and which were mostly repaired before 1992, another product called Febsilicon had already been used. This can be either brushed on or sprayed. Febsilicon penetrates beneath the surface to deposit a silicon barrier which repels water, but still allows the wall to breathe. It is normally used for cement renderings, brick and artificial stonework, and was hitherto untried on mud. The farm walls are still in good condition, though they are in need of some maintenance. The application of Febsilicon thus seems to be quite effective. The chief damage to these farm walls is caused by birds drilling holes into the upper parts, possibly in order to extract the straw. The farm wall surfaces fared well in the rain, but the problem with most silicon-based products is that they create a surface film which does not allow the wall inside to breathe, and interior damage then ensues.

Chemical treatments such as these can present problems by combining with the wall surfaces to create a layer with different expansion properties from the core of the wall. Moisture expansion within the wall, or differential expansion of the surface and core due to temperature and moisture penetration, can cause the surface layer to crack away from the core. It is possible that Febsilicon, like ethyl silicate, avoids these problems, but only time will tell. Neither Febsilicon nor sanotec is yet considered to have been an unqualified success, and other products will be tried later on.

Gypsum / juṣṣ

Since time immemorial, the guest or public parts of Najdi houses have been embellished with elaborate carved geometric patterns in white gypsum plaster. This kind of decoration was most commonly found in the *dīwāniyyah*.

The active ingredient in gypsum plaster is calcium sulphate (CaSO_4). It was made locally in the old days by burning gypsum rock (alabaster) with additives and then crushing it to a powder. This local version, known as *juṣṣ*, is still made in this way and is available in Riyadh.

Juṣṣ is mixed with water and applied to the wall. A template of the desired pattern is then laid to the surface and the design transcribed with a pencil. While it is drying the design can be carved out with a small knife. The most elaborate decorative schemes were applied to the coffee hearth in the *dīwāniyyah*. As in so many other areas, Ibn Ḥāmid turned out to be a walking repository of the requisite skills, and took on the job of carrying out the decoration personally.

Juṣṣ was also used for plastering the benches or *maṣṭabahs* in buildings, and for lining drainage channels or cisterns, as it is waterproof. However, industrially produced gypsum is a more efficient material for such uses today, and the bathrooms and kitchen in the farmhouse were plastered with French gypsum where necessary. French gypsum was also used for plastering the external columns in the courtyard, while the traditional *juṣṣ* has been used for all internal columns.

Fireplaces

Fireplaces for burning wood have been installed in the bedrooms and in the family sitting-room. These are not indigenous to Najd. The fireplaces have been improvised from stone, mud and *juṣṣ*. Traditionally in Najd, a charcoal brazier would have been used for warmth in winter.



A carved roundel in *juṣṣ*.



Ibn Ḥāmid gets to work carving a pattern which has first been incised in outline onto the surface of the *juṣṣ*.



Juṣṣ carving on wall and chimney-breast.

Cooling Tower



Cooling Tower

In al-‘Udhaibāt wind tower is built next to the stairway connecting the ground floor of the house with the roof garden. The house is cooled mainly with this natural cooling device.

Local stone

Traditionally stone was used in Najdi houses for foundations and wall bases of external walls. For this purpose roughly squared blocks were used, as can be seen at Atturaif.

Today the local limestone is much appreciated and widely used as a modern building material. It is very durable and its colour, varying from pale off-white to golden, is pleasing. Cut and polished stone is readily available from a quarry at ‘Irqah nearby, and it was decided to use it where protected surfaces were necessary.

Building a chimney.



It has therefore been used on the bathroom walls and floors, and to make work surfaces in the kitchen and coffee hearth. It represents a departure from strictly traditional style, but the advantages are clear.

A finished chimney.



The traditional house was mud-floored, both in the courtyard and in the rooms. Even the treads of the staircases to the upper storey, if there was one, and to the roof, were made of mud. The dust levels and erosion that this caused would be quite unacceptable today, and the decision was taken to pave the entire ground floor, inside and out, with local stone slabs—something which, after all, would have been quite possible to do in the old days, as suitable flat slabs are plentiful in the locality and can be readily collected. The staircase treads too have been made in stone. The practical benefits for modern living far outweigh and traditionalist objection that might be raised, and the use of paving adds greatly to the feeling of solidity.

The ground adjacent to external walls has been laid with rough local gravel, however. This is to minimize the splashing of rain onto the base of the walls, which can cause serious erosion over time.

Doors and shutters

Najdi builders and householders have always taken pride in the wooden doors and window shutters of their houses. Much workmanship was lavished on these in the past, no doubt partly because of the common instinct among owners and builders worldwide to emphasize doorways but also, in Najd, because wood is a scarce and costly commodity which provides scope for incised and painted decoration. The sight of a brightly painted door in a blank mud wall created a pleasing contrast which was often remarked upon by travelers. The Lebanese-American Amīn Rīḥanī, for example, had this to say during his visit to Riyadh in 1922:

The aesthetic feeling... finds expression in the dedal decorations in plaster on the walls, and on the doors in an abandon of colour. It was always with a manifold pleasure...that I stood before one of those doors arabesque in blue and green and yellow primaries, as it were a famous canvas. The designs are infinite in variety, following the caprice; of the artist; but there is always a harmonious scheme uniformly, geometrically conceived and deftly carried out. ...considering the severity of the surroundings, the spacious and almost empty rooms, the white walls though decorated, the high ceilings, which are covered in the houses of the well-to-do with cotton cloth, a wealth of elaborately conceived and highly embellished designs in brilliant primaries, is a necessary foil, the only balance, in fact, which is adequate and appealing. It is



Dressing local stone slabs.



Stone paving to the courtyard and rooms.

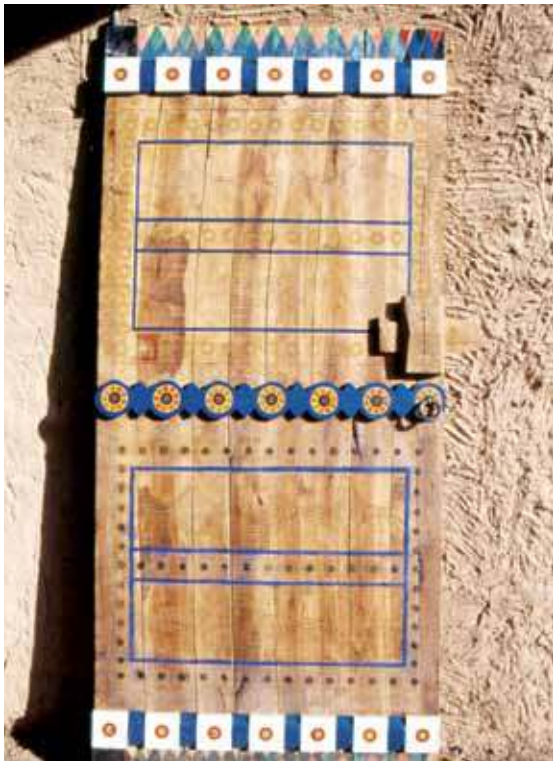


Dressed stone slabs form the stairways-here, of the mosque.





A new door, ready for fixing:
note the refinement of the metal
pivot.



an oasis of colour to the soul.
Amīn Rihānī, *Ibn Sa‘oud of Arabia* p.127.

Doors and shutters were almost always made from the ubiquitous *athl*, sawn into rough and irregular planks braced together with cross-members. *Athl* was to be used at al-‘Udhaibāt, but the use of modern tools and equipment for sawing and shaping the doors and windows was felt to be acceptable. Even so, no craftsman or workshop in the Riyadh area could be found which could carry out this work, even from drawings and specifications. Admittedly this was partly because the client could not supply suitable *athl* timbers, as it was not sufficiently dry. Even so, it was surprising that no workshop could be found. However, the advice given was to try in al-Qaṣīm, specifically in ‘Unaizah, traditionally the home of the finest builders in Najd, in the hope that the craft would not have died completely there.

The door workshop in ‘Unaizah,
al-Qaṣīm.



There was said to be one craftsman in ‘Unaizah who could meet the requirements. He turned out to be making doors which were only superficially traditional, his disappointing workmanship and gaudy colours sure signs of a craft in decline. Finally, a man was found who makes boxes, bowls and other such things out of *athl* wood. This man had an unusually good stock of dry, seasoned *athl* timber. Better still, in his workshop was a new, but faultlessly made traditional door of *athl*. He was taken on to supply the doors and shutters for the farmhouse.

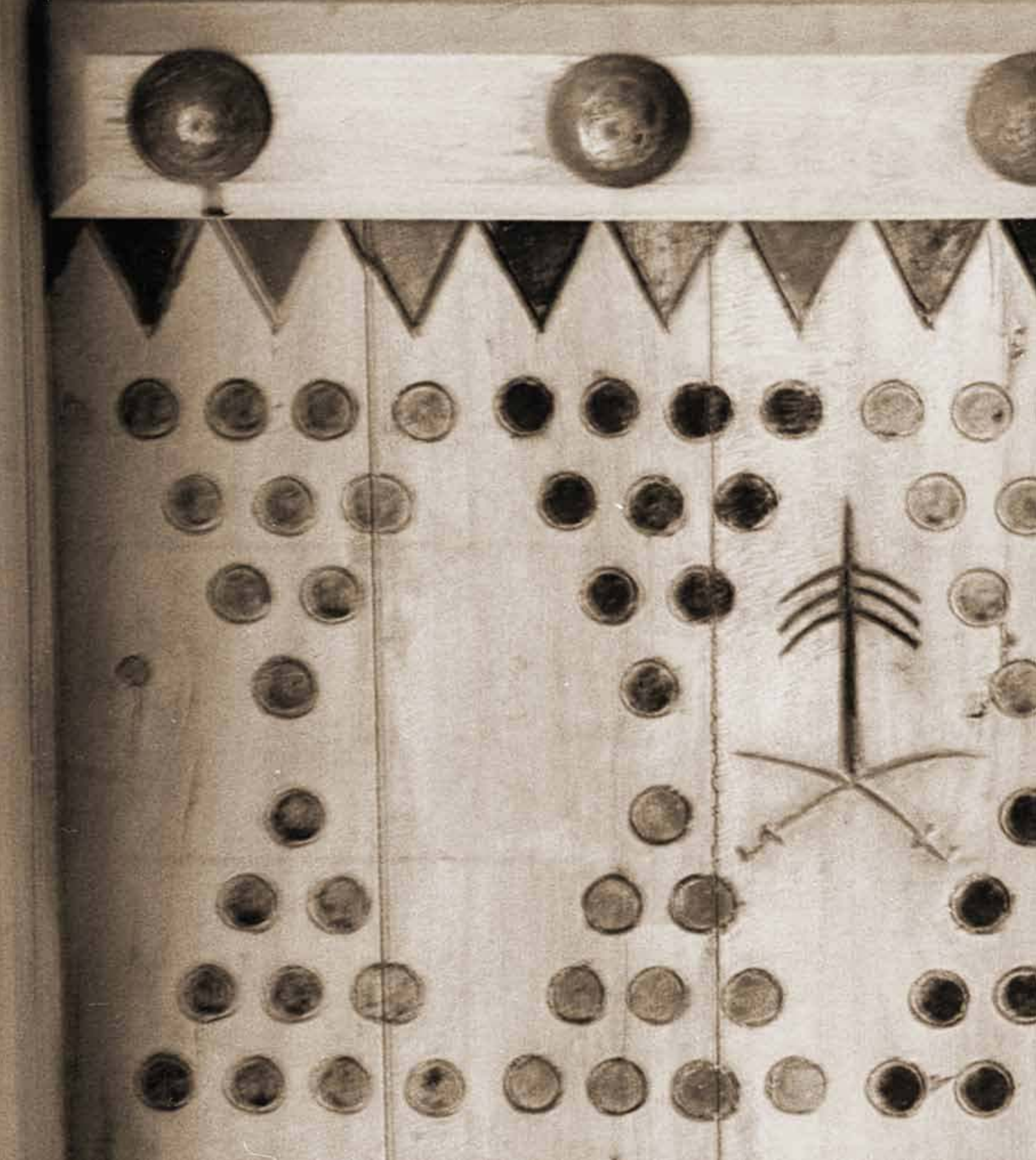
The door opening onto the
courtyard.

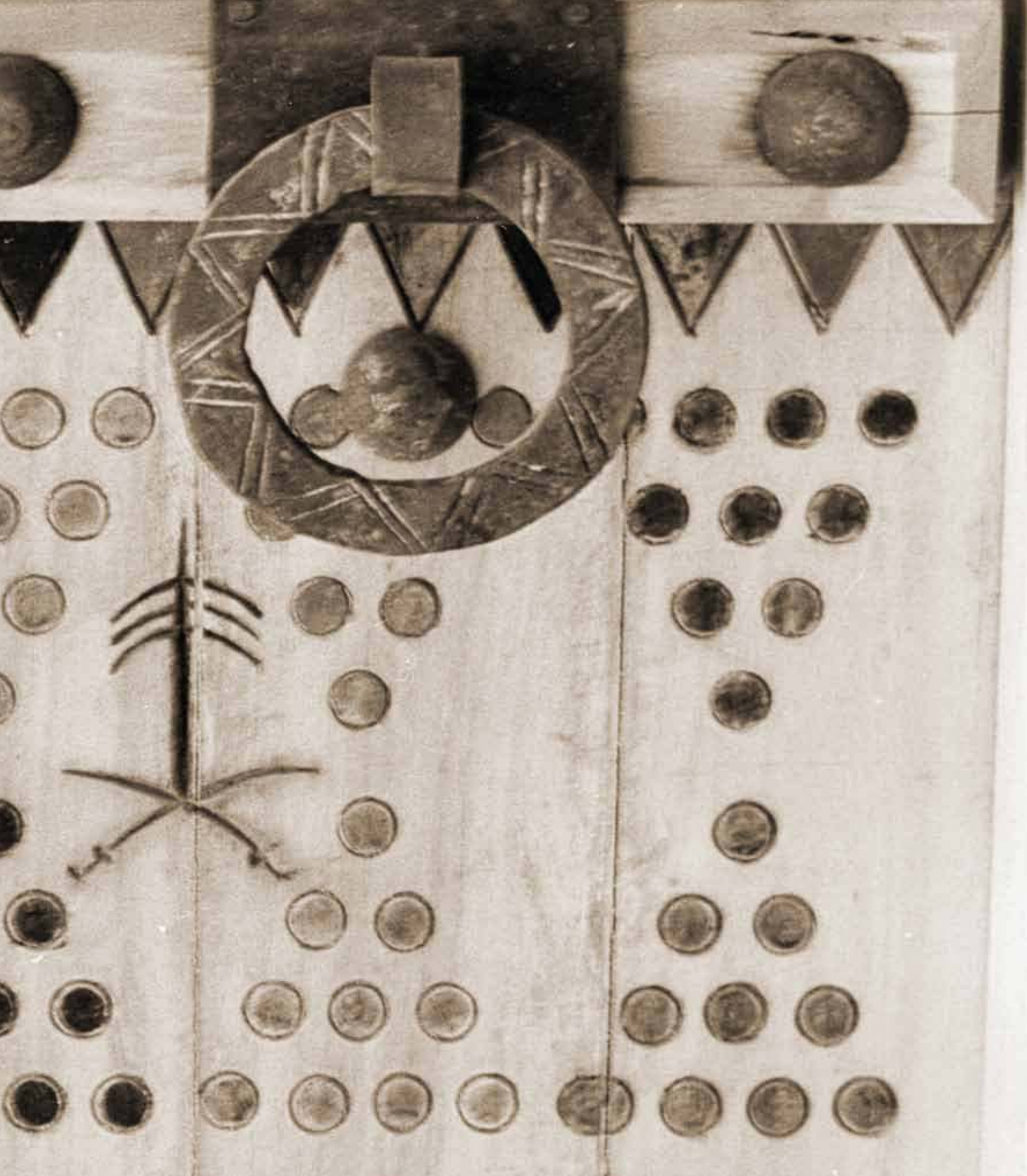


Previous page Doors and lock
detail.

Opposite The west door.







A window shutter on the east wall. At al-‘Udhaibāt shutters are hung on the external face of the building instead of inside the reveal of the window aperture, as traditionally done. This looks good and allows the windows to be opened wide, but is not so practical from the point of view of maintaining the shutters in good condition by protecting them from the sun and rain.



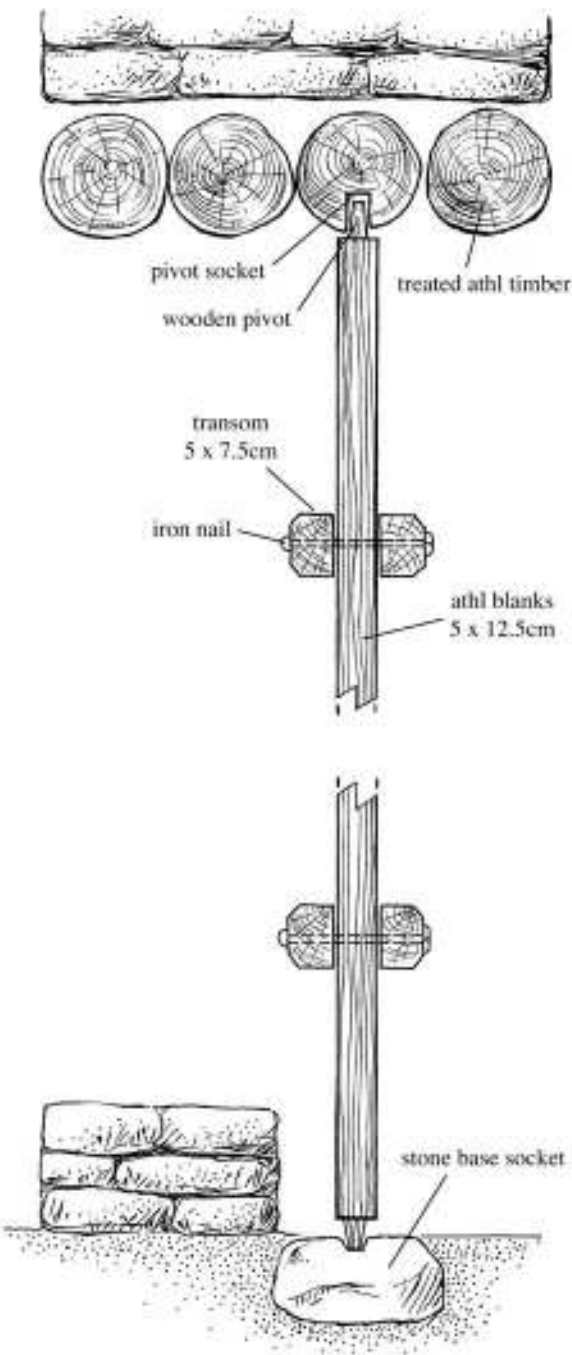
An incised but as yet unpainted door, before fixing, shows the integral wooden pivots at top and bottom which serve as hinges.



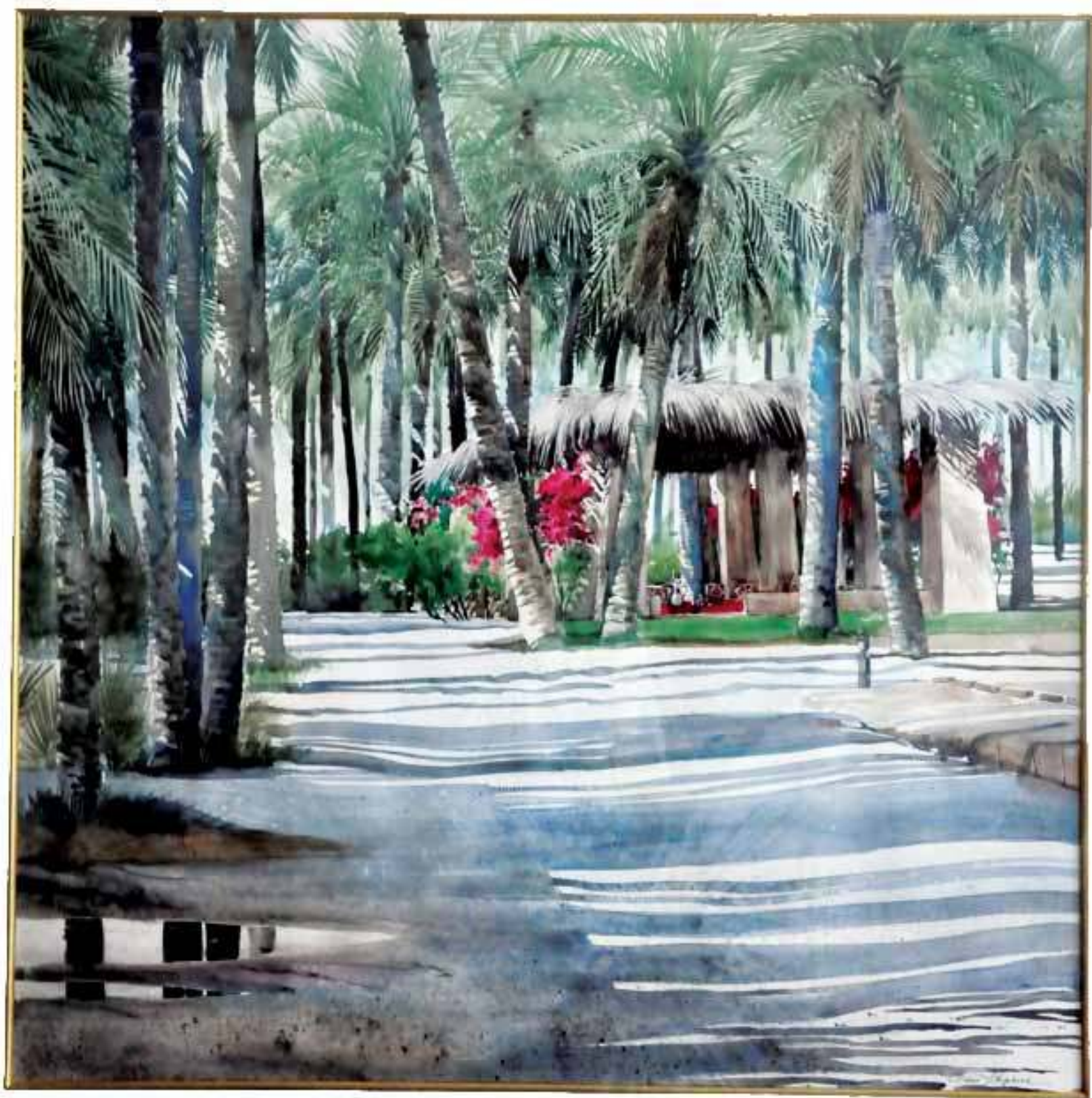
Right Cross-section of door construction.

Opposite The main gate from the outside.

Previous page Doors and lock detail.







6

Reclaiming the Farm

..we sat imbibing coffee and incense in a mud-built bower. We then moved off to an inner walled garden with a great profusion of peach-trees, fig-trees, pomegranate-bushes and vines, where, under the shade of a spreading fig-tree and a thatched shelter, we lay on rugs by a runnel of sparkling well-water, chatting and playing with the royal children-a charming company consisting of Ibn Saud's sons... They played as any children might, messing with the mud of the little runnel and flitting elf-like about Ibn Saud, who with his hand flicked water at them till they would rush off to other mischief and return anon with a rich booty of unripe peaches.

H.St.J.B. Philby, *Arabia of the Wahhabis* p.34, describes a picnic in the heat of midsummer 1918 in a garden in the Bāṭin of Wadi Ḥanīfah, near Riyadh.

Opposite The garden in Al-'Udhaibāt.



Restoring the soil

Al-‘Udhaibāt was built as a farmhouse, and the estate which it serves is an integral part of the restoration project. When Prince Sulṭān took over the farm in the late 1980s, the area fell into five parts: the old palm groves in the four eastern plots along Wadi Ḥanīfah; the ravine behind the farmhouse; the two northern plots of ‘Aidat al-Suflā and ‘Aidat al-‘Ulyā, which were being used as a soil quarry and rubbish dump; a garden area within the two northern plots which was walled and served by two old wells; and the flat cliff-top plateaux above the farm, which were barren but scoured by runoff channels and covered with a sprinkle of wild flowers and grasses after the winter rains.

The four eastern plots were still cultivated, if rather neglected and overgrown, with the cob-built farm walls in a somewhat tumble-down state. The tall date palms in them are thought to be between forty and sixty-five years old—that is from the period of King Faiṣal’s ownership—and some are even older. The two northern plots, however, had lost their planting, it is said because their wells had dried up. Only the walled garden within them, now marooned across a causeway between deep quarry pits, was maintained. The ravine area behind the farmhouse was not planted at the time, though it might have been at an earlier period: since the cisterns filled from the great well are sufficiently high to allow gravity flow into irrigation channels on that side, it seems that the well may have been planned partly for that purpose. But latterly it seems that the ravine area had been used for keeping animals.

Managing the ravine and the plots near the farmhouse, which were already cultivated, back to agricultural productivity was clearly a priority. But the really difficult problem was



The two northern plots of ‘Aidat al-‘Ulyā and ‘Aidat al-Suflā had been used first as a soil quarry and dug out to 13m deep. Then they were used as garbage dumps. An old walled plot with two wells was left undisturbed: its wall can be seen here along the top of the excavation.



The old walled plot with its two traditional wells in the northern area were not affected by soil quarrying. It can be seen in this view after restoration of the whole area.



The pits in the northern plots had first to be cleared of garbage, before waste hardcore was spread and compacted as a base for new soil.



New subsoil was brought into the northern plots and compacted, layer by layer.

Opposite When Prince Sulṭān acquired the estate it was farmed but somewhat overgrown.



The garden and fountain in al-'Udaibāt.

what to do with the two northern plots—an area of 8 hectares severely disfigured and polluted. Clearly no half measures would suffice if this land was to be reclaimed as a farm. At the very least the garbage would have to be cleared, and consideration was given as to what to do next.

The northern plots are composed of naturally sedimented alluvium washed down by Sha'ib Şafār and, before quarrying, their soil level had been only slightly above that of the channel of the Sha'ib. The plots were very accessible to the Wadi Ḥanīfah road and, when this part of the farm failed owing to water shortage, it was seen as fair game by contractors as a source of sub-soil for back-fill elsewhere, and began to be excavated and removed. These quarry pits grew until in places they were as much as 13 metres below the level of the road. In all, about 400,000 cubic metres of soil were removed. The pits became convenient dumps for all

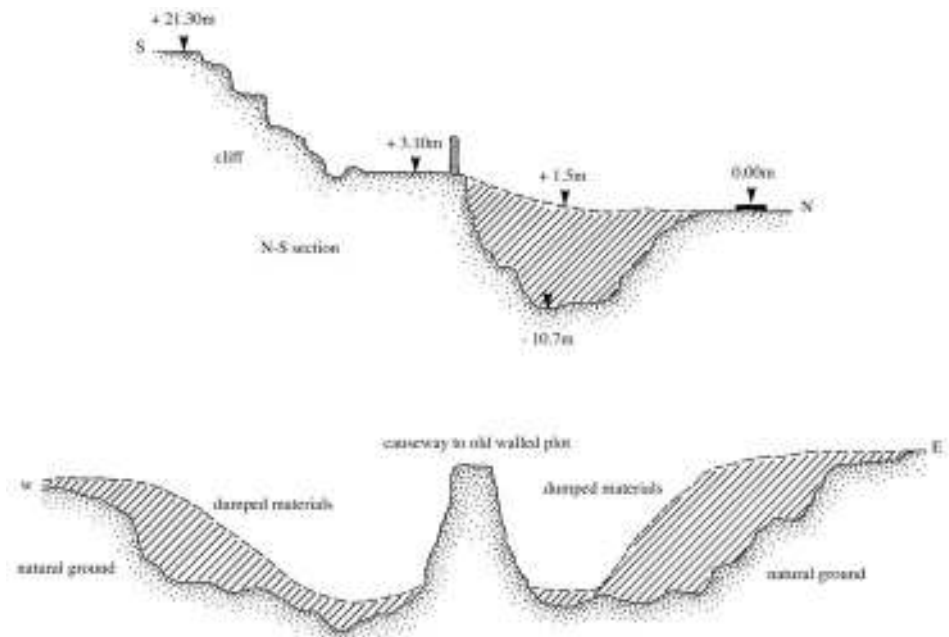


Wadi Ḥanīfah after rehabilitation.

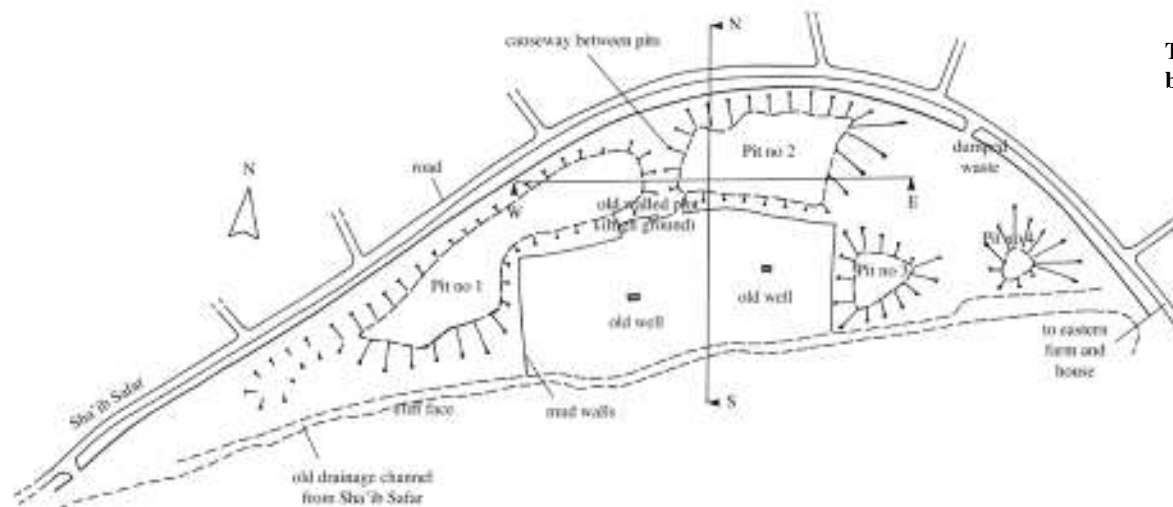
kinds of large-scale garbage, including building and industrial waste. By the late 1980s the area was not only an eyesore, but also leaching of the waste into the sub-soil presented a positive threat to local ground-water quality.

Prince Sulṭān took the decision to restore the land completely. This was a gigantic project for an individual to undertake, in view of the mountains of rubbish to be disposed of and the volume of new soil to be brought in.

The first step was to sort and remove all environmentally harmful materials: plastics, metals and rubber tyres. Wood—largely old palm trunks—was burnt in place and the ash left as fertilizer. Most of what remained was builders' rubble and hardcore. This was crushed and compacted in a layer 50cm thick on the bottom of the cleaned-out pits.



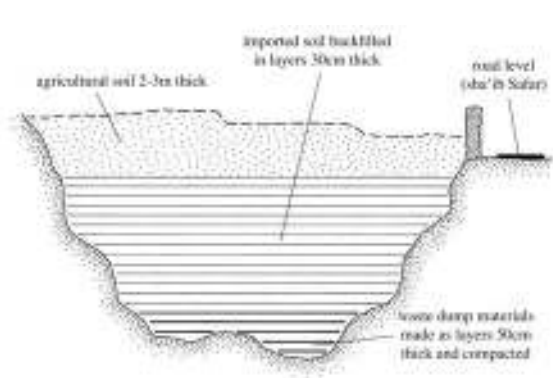
Cross-sections of garbage pits (not to scale).



The northern area of the Farm before reclamation.

Next came the problem of filling the voids. 400,000 cubic meters of good alluvial sub-soil had to be found from another, similar source, trucked to site, and then, to avoid subsidence later, compacted to almost the same density as the original soil.

Back-filling was done in layers of 30-40cm, each one compacted. When a level of one meter below the level of the road in Sh'ib Şafâr was reached, agricultural top-soil was laid and raised to one meter above the road level. This top-soil was brought from various areas in the locality such as al-'Ammâriyyah, al-Wuṣail, and particularly from the dam up Sha'ib Şafâr. Here fertile alluvial sediments had built up behind the dam, and its removal was of benefit to the dam's water capacity. In all, the huge operation to reclaim these two northern plots, including planting, took about fifteen months and cost five times as much as the rebuilding of the farm house and the reconditioning of the rest of the estate.



Top right Cross-section of topsoil and backfill (not to scale).

Centre New farm roads and culverts have been built throughout the estate.

Right Back door leading to Mosque.

Opposite Al-'Udaibât's historic location at the junction Sha'ib Şafâr with Wadi Ḥanifah is demonstrated by this aerial photograph: the ruins of Atturaif can be seen clearly in the top of the picture. Within the estate the area of old palms shows as black, while the new planting shows up as grey. The house itself occupies the mouth of the ravine where it joins the fertile alluvium along the west bank of Wadi Ḥanifah.





Shaded seating areas have been built among the palm groves.

Opposite Al-‘Udhaibāt Farm: the completed layout during rebuilding.

Over page Looking north across the planted ravine, where the fertile soil made the young palms grow tall.

Young vegetables grow well in the protective shade of the palms.



Landscaping and planting

Once the final soil layer was in place, and the slight slope downwards from west to east graded in accordance with the fall of Sha‘īb Ṣafār, landscaping and planting could begin. New farm walls were built along the Sha‘īb, and the old boundary wall of the four old plots restored in original style, with stone retaining walls holding back the soil, topped by cob layers. Internal farm walls were restored in cob layers. Shaded seating areas have been rebuilt.

Dates are no longer the staple food of Arabia. However, landowners still develop farms with the principal aim of growing the different varieties of palm tree, out of pride in this deep-rooted agricultural heritage. But palms also still have a basic agricultural function, to provide the partially shaded and humid environment for other food-plants-fruits, vegetables, herbs and cereals. So any planting scheme in Najd where water conservation is a priority, as it is at al-‘Udhaibāt, must still be based around palms.

Date palms therefore dominate the planting scheme. There are now more than 1,500 of them on the whole estate, and an additional eighteen varieties have been added to the ones already there. In and around them tamarisk (*athl*) trees, ornamental trees of various kinds and fruit trees have been planted, including oranges, lemons, vines, pomegranates and figs. Thick hedges of Albizia and Ficus act as wind-breaks. Vegetables are grown for consumption by the extended family: lettuce, cabbage, cauliflower, peas, beans, carrots, onions, garlic, melons, pumpkins, courgettes and tomatoes. Alfalfa is grown for fodder.

KEY

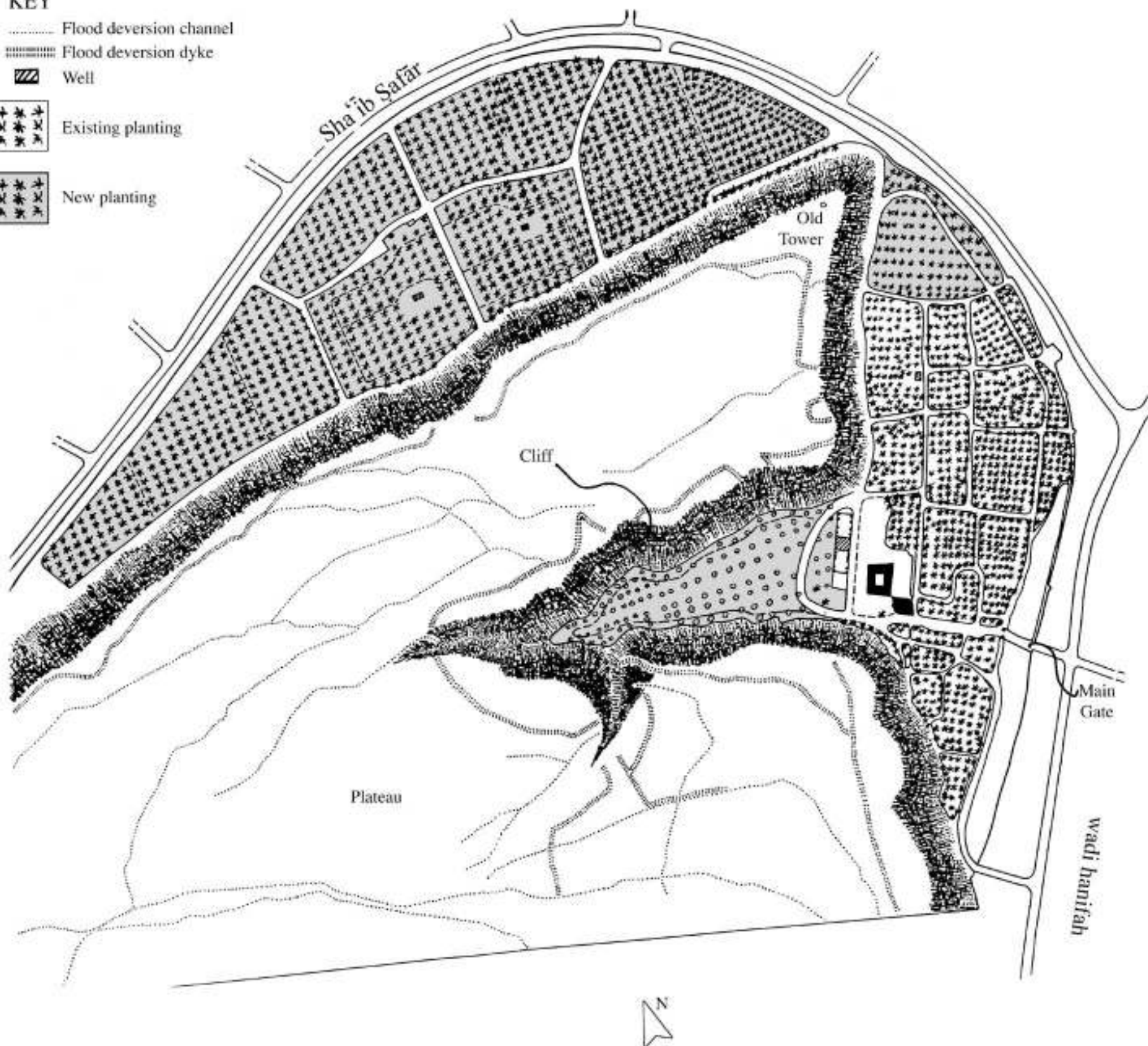
..... Flood diversion channel

||||| Flood diversion dyke

Well

Existing planting

New planting









Wells and irrigation

The list of vegetables and fruits grown today by the Egyptian gardeners is very similar to those grown traditionally, and it is sometimes not hard to imagine that one has been transported back into the kind of scene which Philby described so well in *The Heart of Arabia* and elsewhere.

In fact it is much more tranquil nowadays. In the old days life on the farm was accompanied all day and, in summer, all night too, by the creaking, whining and groaning of the well wheels. In those days, a farmer was hard put to it to water more than a single hectare from one well, given the rate at which the donkeys and mules could haul the water up, and the wastage from the earth irrigation channels. So plots were smaller, not on the large scale seen today, and less geometrically laid out.

In those days Najdi farming used, by necessity, to operate within the carrying capacity of the shallow water table, which was replenished by the annual rains. As much use as possible was made of seasonal surface run-off. King Faiṣal built a channel which led water along the base of the cliff from Sha‘īb Ṣafār and round into the four old plots. At its western end there was a bridge over this channel which also operated as a sluice to control the flow of water both into and out of it: as well as coming from the wadi, water would flow down the cliff into the channel and be prevented from flowing out into Sha‘īb Ṣafār. There are still similar channels along the base of the cliffs lining the ravine behind the farmhouse. Dykes on the flat plateau above the cliffs have been arranged to direct the flow of water down into these channels.

Today in Saudi Arabia, mechanical irrigation systems pump up water from deep aquifers and



One of the two old wells in the walled area of the northern plots before renovation.



One of the two old wells in the walled area of the northern plots before renovation.



The masonry of the restored well demonstrates the care with which Najdi farmers lined their well shafts.

Opposite In the fierce heat of Najd, fruit trees and vegetables can thrive only in the partial shade provided by date palms.

A renovated well and pool among the old palms.



The new irrigation system pumps up water from an aquifer about 200m down.



distribute it through overhead sprinklers or underground pipes, cutting out wastage through leaking, giving the farmer much more water than in the past and making much larger farms possible. This deeper fossil water is, however, non-renewable. It is inevitably depleted and, in many farming areas recently, mass water extraction has resulted in the drastic lowering of deep reservoirs. Such short-termism in the exploitation of a non-renewable resource is now widely accepted as unjustifiable.

At al-‘Udhaibāt Farm water is pumped up mechanically from three wells, but the accent is on water conservation. One of the wells dates from the time of King Faiṣal and, at 40 metres deep, is relatively shallow. The other two are in the northern plots of ‘Aidat al-Suflā and ‘Aidat al-‘Ulyā. They were installed by Prince Sulṭān and pump water from about 200 meters depth.

The great well

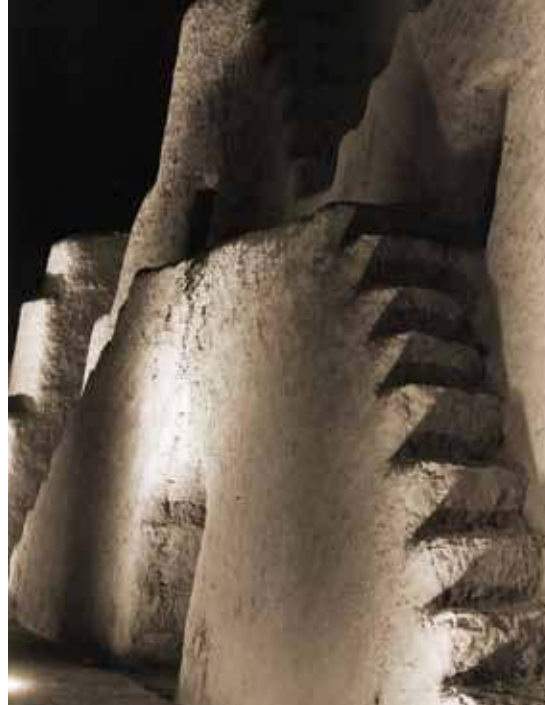
The great well behind the farmhouse is a powerful symbol of the old farming ways, and much care has gone into its restoration. Without these great wells, settled life in central Arabia would have been inconceivable, and their importance was reflected in the skills and care which went into their construction and operation.

The English traveler Charles Doughty, on his lone, epic journey through Najd in the 1870s, witnessed the digging of one of these wells in al-Qaṣīm. Though the work called for the highest skills of the Najdi stonemasons, and the construction was more permanent in character than that of most Najdi houses, Doughty’s account shows that it could be carried out with surprising speed.

*I saw their wells, sunk in the Nefud sand,
- which is not deep, and through a bluish
white underlying clay into the sand-rock:*

these wells, steyned with dry masonry (such as in Western Arabia would be reckoned works of the ancients!) are begun and ended every day in el-Kasim. By-wells, of less cost, are digged like wide sand-pits to the clay level; and they fence the sliding sides of sand with faggot-work. Over the well-hole, sunk square through the clay in the pit's midst, is set up a rude frame of ethel studs, for the wheel-work of their suanies; such are commonly two-wheeled pits. The setyned wells, made four-square, are for the draught of four camels; and there are some double wells of six or eight wheels, to water greater grounds, made long-square; the camels draw out from the two sides. To the ground-water they count seven fathoms; it is eight at the summer's end. Doughty Arabia Deserta vol.2 p.355.

The great well at al-'Udhaibāt and the other, smaller ones on the estate, are a vivid reminder of the toils and hardships of the past and the toughness and endurance of the Najdi farmer through the centuries.



The great well restored.



The great well at al-'Udhaibāt standing derelict, c.1991, looking along the ramp up and down which donkeys and their drivers would have toiled ceaselessly throughout the summer months, and during much of the winter and spring too.



***Below* The great well restored.**

Over page Sculptural mud pillars on either side of the well ramp supported a shade structure which protected man and beast from the torrid heat of the Najdi sun.







7

Adobe for Living

... it is by conforming to the rules of tradition that the masterpiece is created. The method of the traditional artist is through: the intelligent repetition of ideal “prototypes” when applying them to any given circumstances; the simplicity of operation and the attainment of grace through the process; and, by the perfection of techniques, the mastery of the craft.

Traditional art does not seek to flatter the ego of the individual by promoting the artist as a special man, but rather nourishes the soul by achieving, in every man, a special artist.

‘Abd al-Wāḥid al-Wakīl, MIMAR Magazine No. 19, January-March 1986

Opposite Ibn Ḥamid paints the main gate.

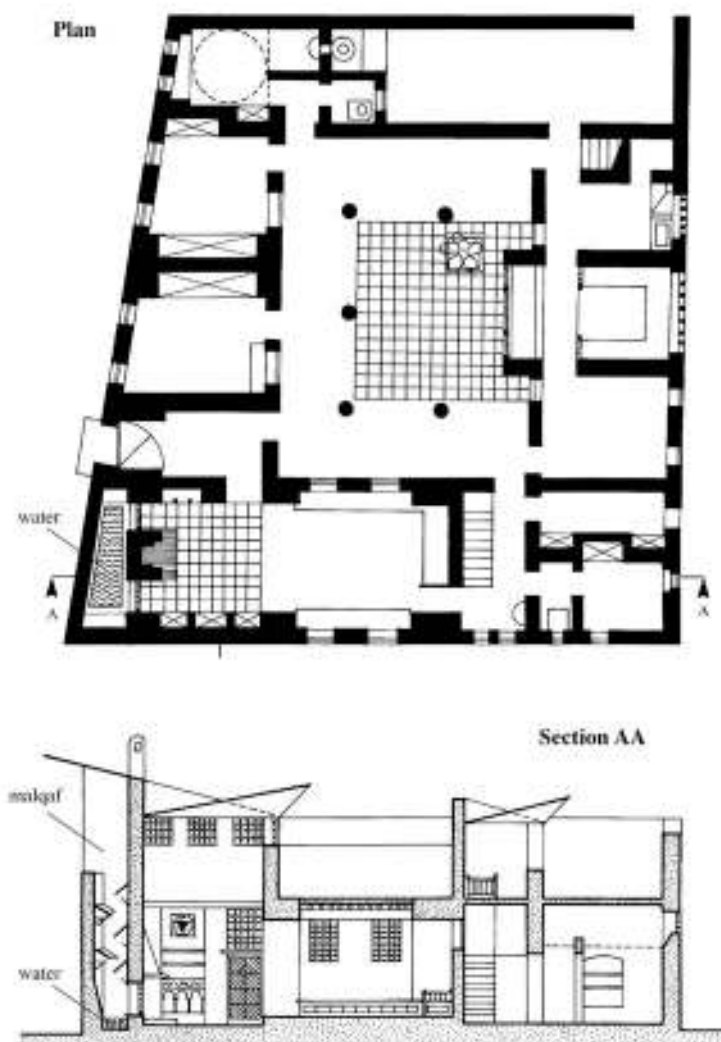


Adobe: mud brick versus mental block

Al-‘Udhaibāt’s rebuilding is intended to be the opening motion in a debate, and not the last word on the use of adobe in cotemporary building in Saudi Arabia. That debate has been dormant here since Hasan Fathy produced designs for houses in ad-Dir‘iyyah in Saudi Arabia in the 1960s, at the invitation of the Ministry of Social Welfare, when he also met King Faiṣal. Al-‘Udhaibāt will, it is hoped, rekindle the spark of interest among clients, architects and planners, and stimulate new experiments aimed at rehabilitating the material.

From what has been said so far, it seems obvious that adobe has many potential advantages today, both as a cheap and efficient material and in restoring to Saudis a sense of their cultural roots. The basic problem, as Fathy discovered, is not with the material itself, but with the prejudices ranged against it and with the interests vested in the use of industrialized building materials. Much of Fathy’s life was devoted to overcoming the entrenched attitudes of public bodies, which would rather build expensive and inappropriate housing using expensive professional expertise and inefficient energy-intensive materials, than cheap housing in familiar local materials suited to the needs of the people who would live in it.

In January 1996 the farmhouse at al-‘Udhaibāt was just completed: pristine, fresh, clean, with no sign of damage. In peak condition, its rarity value made it a great novelty for visitors, most of them Saudis, who were able to experience in a very authentic way the kind of architectural surroundings in which their grandfathers had been raised. Inevitably in such circumstances a great deal of nostalgia comes into play. The real test of whether such projects are serious endeavours, or just playthings, starts with the first rainstorm.



House by Hassan Fathy at ad-Dir‘iyyah, 1975: natural ventilation by the *malqaf* wind-catcher cools the air by passing it over water.

Opposite The main gate of the house at al-‘Udhaibāt.

Earth and stone, water and palms: the harmony between the man-made and natural environment at al-'Udhaibāt is well-expressed in this architect's perspective.

The storm of March 1996 was one of the heaviest on record. Wadi Ḥanīfah became a swirling river. The first serious damage to the farmhouse was anticipated: leaks were expected to come through the roof, parapets to be undermined, channels to be scoured through the run-off gutters, and external plaster to be eroded. In the event, damage was minimal and the house stood up to the storm rather better than some modern buildings.

But with the normal run of mud houses in the old days repairs would have had to be made, and maintenance carried out on an annual basis. Such repairs and maintenance would be very simple. Nonetheless the idea that a building needs constant attention in this way has a certain ideological implication.

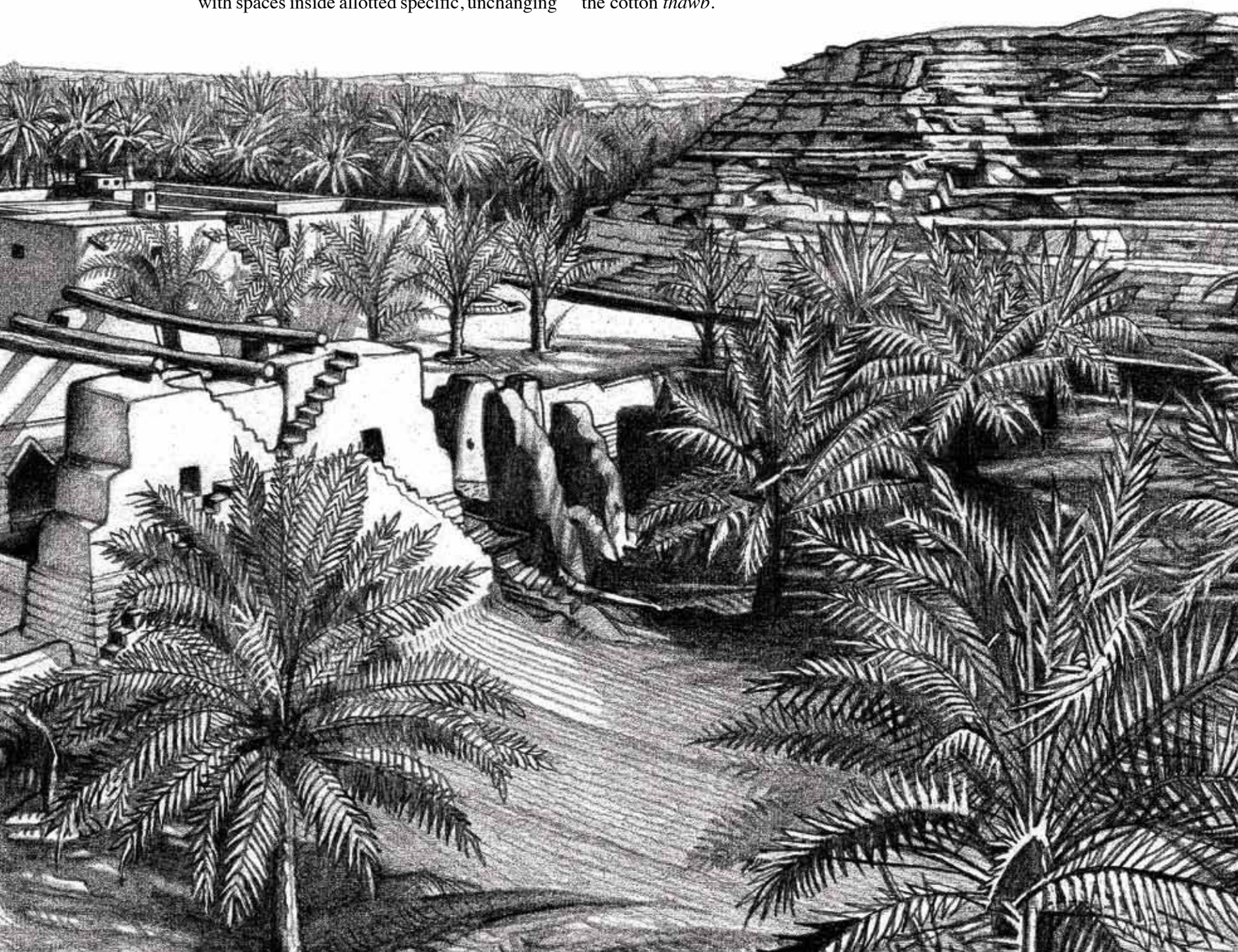
It is here in the ideology of the way we see housing, not in the ongoing need for simple



repairs, that the problem lies. During the 20th century the export of industrialized building methods from the developed world has been accompanied by the export of an idea of what a house should be. The concept of a house has everywhere undergone a subtle change. The Western idea of a house is that it should be a hard, geometrically constructed shell, indestructible, impermeable to water and weather, requiring minimum maintenance, with spaces inside allotted specific, unchanging

functions. It is an idea characterized by rigidity, straight lines, right-angles and impermeability. Its origins in European architectural writing can be traced back at least as far as the Roman architect Vitruvius.

The difference between this idea of a house and that in the arid lands is rather like the difference between a Western suit and the Arab's traditional robe, in the case of Saudis the cotton *thawb*.



The suit is a well – stitched barrier between the body and the weather, complex in design and tailored exactly to fit its wearer. It is a close-fitting garment, an essentially constricting affair, which has evolved in a climate where the problem is to stay warm and dry.

The *thawb*, on the other hand, is a versatile, loose-fitting garment the precise fit of which is of little importance. Everybody wears it. It is eminently practical in the heat, its object being to shade the body and provide plenty of space for the free flow of air around it. Its purpose is to mediate between the elements and the body, rather than to interpose itself as a barrier. It is flexible: ironed and starched, it can be worn formally, while girded up it can be worn for labouring.

It must be obvious from this account what any sensible person would choose to wear

in an Arabian summer. If the world were as purely rational a place as planners and economists would like to think it is, then anyone who chose to wear a suit in the Saudi Arabian summer, instead of something cooler, would be regarded as distinctly odd. However, our choice of clothes is governed more by the social messages we wish to convey than by utility and convenience. Such is the power of these symbols, that the Western businessman or indeed the Western planner or economist would be aghast if he was offered the choice of wearing of *thawb*. He prefer to stick (usually in both senses) to his suit. And he is probably right in doing so, because for Saudis too the wearing of a *thawb*, as well as fulfilling a practical purpose, does indeed carry a symbolic as well as a functional significance, and it would not be regarded nowadays as appropriate for a foreigner to dress as a Saudi Arabian.

Right Prince Sulṭān watches as Ibn Ḥamīd incises the Saudi Arabian emblem of crossed swords and palm tree onto the postern in the main gate during rebuilding.

Opposite The Majlis, A fire place is often necessary in the cold Najdi winter nights. The interiors at al-‘Udhaibāt combine traditional spaces with modern expectations of comfort.





Over page At one with its environment, the house stands at the mouth of the newly planted ravine.

Opposite Niches in carved gypsum bring rhythm and variety to interior wall surfaces.

Western dress is used as the medium for a more complex set of social messages than is the *thawb*. The most striking article of dress is the tie: an item whose role in the ensemble, given that it is impossible to divine any truly useful function for it, is wholly symbolic. The *thawb*'s form, by contrast, is adapted rather closely to its many practical functions, and it is a somewhat egalitarian garment. It is thus relatively- although, of course, not entirely – free of the socially symbolic messages which endow Western dress with such rich pickings for semiologists.

It is the same with our assumptions about housing. The mind-set we bring to our choice of house is as governed by the signals we wish to emit as the one we bring to our choice of clothes. Mind-sets are by their nature insidious: we are unconscious of them, but they colour the way we interpret the world and our judgments as to the way things should

be done. In the case of housing, the West has succeeded in exporting its mind-set along with its industrialized materials and methods. In the quite understandable rush to sell and to achieve Western standards of comfort and material convenience, neither exporter nor importer has stopped to consider whether materials or mind-set are appropriate to the new context.

Saudi Arabians have retained the *thawb*, but they have abandoned adobe. We have seen in Chapter 1 why this should be so: adobe carries a message of backwardness and poverty which the dress code does not. However, it is now time to examine whether it is time to change the connotations attaching to adobe in Saudi Arabia. This is particularly urgent now: however seductive Western conveniences and comfort standards may be, they are almost certainly not going to be universally sustainable in the long term, either in Saudi Arabia or in the West itself.

Niches in carved gypsum containing traditional food serving utensils









Over page General view of the great well and the pool in al-'Udhaibāt

Earth-built houses in the arid lands are essentially gentle, environmentally harmonious buildings, locally made and individually unique. Each one expresses the needs for which it is made and the taste of the family which organized its construction. Its interior spaces, unlike those of the Western house, are multi-functional, especially on a seasonal basis. It is a soft-edged shelter made from the earth on which it stands, moulded by eye without the aid of drawing-boards or architects. It can grow organically with a families needs and can be dispensed with equally easily. Its materials are recyclable, the processes involved in its construction reversible. Like a *thawb*, it is a loose, flexible, airy thing. After a storm, of course, it is natural that such a building may need to be repaired.

It is perfectly simple to repair it with mud. The damage will only be surface damage, the walls are permeable, and any moisture reaching the core will dry out. A well-built adobe wall will last structurally for decades. After all, the old palaces of Atturaif have stood unmaintained and roofless since 1819. Yet the fact that a building may be vulnerable to storms does not accord with the Western idea of what a house should be: a house should be a durable thing, not requiring annual repairs like an earthen house; any such building must be essentially inferior; cement is durable, and therefore must be superior to raw earth.

This attitude has infected a generation. It has led directly to the creation of mass housing projects which have been paraded by officialdom on the

Right Sun, palms and mud walls create many satisfying abstract effects.

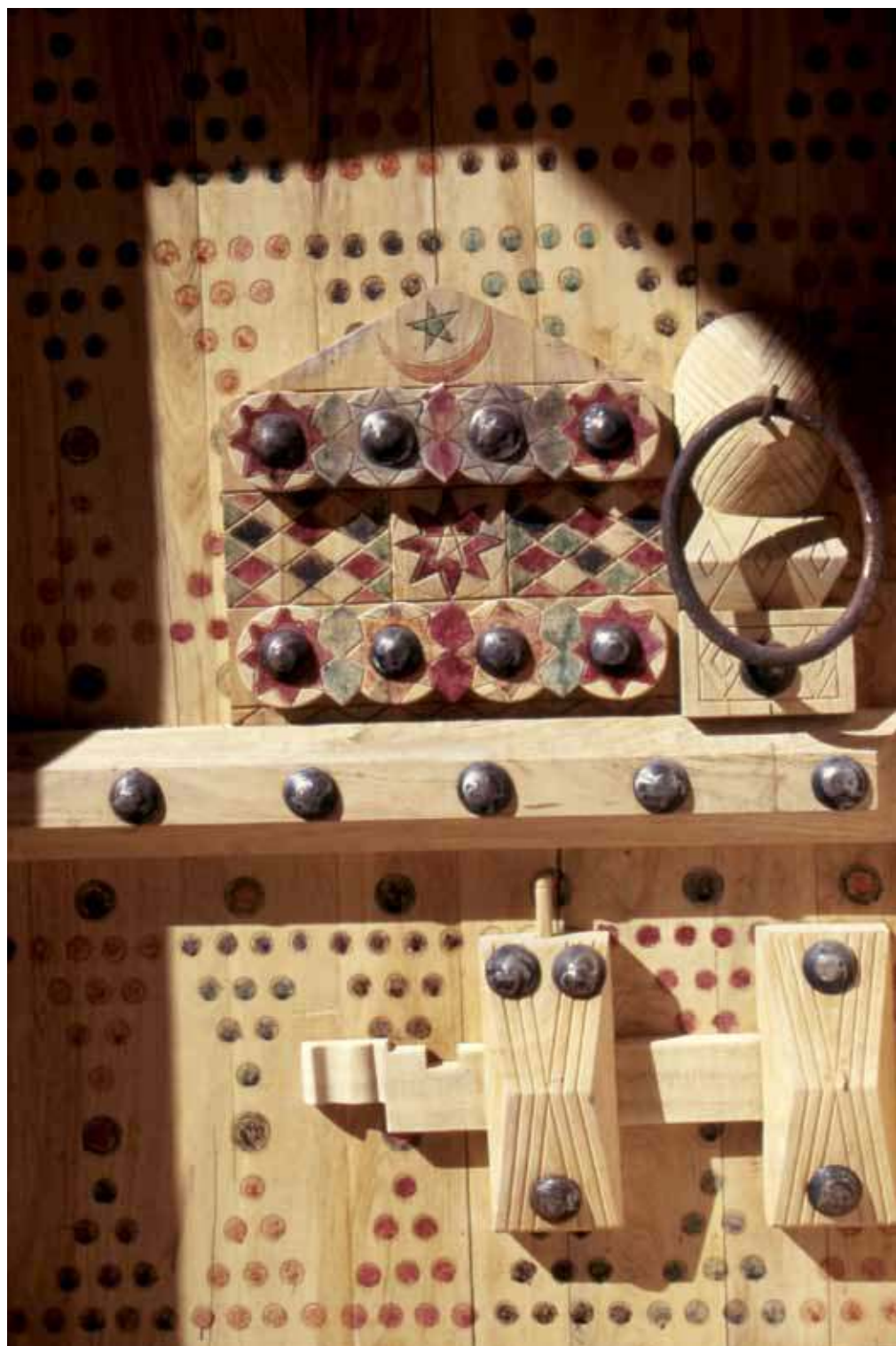
Opposite Door and lock detail.



one hand as the last word in public housing, but shunned wholesale by their intended occupiers because of their stunning ugliness, uniformity and ineptitude. They have been inappropriate to the climate, and inappropriate to the people. Hasan Fathy has many entertaining tales to tell about his depressing struggles with vested interests and official attitudes, but few are more telling than this one: in a government building in Cairo, so much sun poured through an office's glass wall that, despite the air-conditioning, an important official had to shift his desk to a corridor, where it was cooler. His department? The Building Research Centre.

Such white elephants are obviously misconceived, yet they will continue to be built. The odds are now stacked against a return to old-fashioned ways. First of all, with every passing year, traditional building techniques draw closer to vanishing point. The knowledge is stored in the old master-builders and carpenters, and they are now a dying breed. Those few remaining such as 'Abdullah bin Hāmid are national treasures whose skills need to be taught to a new generation. This collapse of skill traditions is taking place all over Arabia at an unprecedented pace. The only alternative will be for enlightened patrons such as Prince Sulṭān to take an interest and develop adobe building methods from scratch.

Secondly, economic growth requires our progressive addiction to goods that have to be paid for. To keep our economies expanding we must all, as individuals, become less and less self-sufficient and consume more and more goods. More and more desires must be converted into essential needs; gone in most of Arabia is the noble old desert ethic of doing without. Increasingly what we used to take for granted as freely available for the common good is taken into ownership either through nationalization or privatization, so that it can be processed and sold as a commodity.









The Benches along the wall of the house.

***Opposite* The courtyard of the house seen from the roof.**

This is a natural free-market process which has as its positive side the unlocking of human ingenuity and enterprise. But there is a price to pay, and it may not be any longer the way forward for individuals in a world of growing populations, shrinking resources and economic globalization. The global process takes place at the progressive cost of local and national autonomy, as we are all drawn into the macro-economic system as consumers. Local style and colour gives way to international standardization. In just this way has the wonderful variety of local building styles in Saudi Arabia given way to the uniformity and professionalization of modern building practice. Who is to say whether we are really better off in the long run?

Of course there are extenuating circumstances. Modern housing in Saudi Arabia was built under pressure of time and large-scale demand as immigrants and nationals were drawn into its cities. Imported industrialized systems were the only ones which could meet such a demand. This was combined with an attitude which saw the past as “primitive” and “backward”. Building styles and methods of the past were rejected out of hand as being part-and-parcel of this backwardness. They were felt instinctively to be unable to accommodate modern amenities, and no experimental studies were undertaken. The crumbling vernacular buildings of the old town centres became the shanty housing of immigrant workers. Cheap energy too has meant that the passive temperature-regulating quality of adobe has been exchanged for mechanical cooling systems, installed in buildings which are inappropriate to the climate. The urge to reject the past in this way is perfectly understandable: the grueling hardship of life before oil wealth is still a living memory for many. But it is not a long-term answer.





Adobe and the modern house

In any case the comparison between a new concrete building and an old adobe house is unfair. Abandoned mud buildings seldom make attractive or romantic ruins. An exception can be made perhaps for the Salwā Palace complex at Atturaif. But, as a rule, crumbling adobe structures deteriorate very quickly into shapeless piles of termite-ridden mud, drifts of dust and precarious fragments of wall. They cannot hold the same nostalgic fascination, nor hold out the same range of lifestyle possibilities, as the old stone or timber-framed farmhouses, manors, barns and cottages of Europe.

As a newly constructed adobe building, al-‘Udhaibāt farm redresses this imbalance. It reminds us of how a new-built and well-maintained earth house can be, with its clean, pristine walls, sharply defined light and shade, fresh carved plasterwork and vivid painted designs on doors and shutters. Provided with the basic amenities of modern living, it demonstrates a real alternative to concrete, glass and structural clay tile. It stands as a stylish alternative to their alienating anonymity, its spaces in tune with local needs and culture.

It is quite possible that, without the oil boom and the rush into modern materials, local adobe building might have developed naturally in this kind of way. It provides an elegant solution to different types of residential need, from small houses to large villas and extensive compounds. If applied on a large scale, traditional materials would gradually affect the urban design of entire neighbourhoods, and the urban landscape would undergo a slow change, as low-rise residential areas currently make up more than 50 per cent of the total city area in Saudi Arabia.

Whether adobe can indeed provide a solution to mass urban or rural housing is, of course, one of the debates which the al-‘Udhaibāt project is designed to revive and sustain. Al-‘Udhaibāt as it stands is something of a one-off prototype, a Rolls-Royce among mud houses, built to the highest standards. It could only have been built by a patron prepared to invest in it. As a farmhouse on an estate with a permanent labour force, al-‘Udhaibāt can develop and draw on a pool of the skills needed to maintain it. Possibly these skills can never be available on a mass housing scale in a diversified economy: the need for constant maintenance perhaps requires a peasant economy where the householders themselves have the building skills and the sense of community to make them available to each other. Unless certain technical refinements are added, after careful development, such as impermeable wall cappings and roof structures – as has been done in the American south-west – adobe housing may never meet the needs of large-scale housing. And of course it remains to be seen if the building cost per square metre of adobe can make it competitive with other materials.

So al-‘Udhaibāt as it has been built does not provide final solutions. Some of the decisions taken as rebuilding proceeded, like the ones not to use termite barriers or roof membranes, may turn out to be untenable. However, it will undoubtedly reveal those areas in which further research and development is needed to make adobe into a working alternative in Saudi Arabia to concrete block. Al-‘Udhaibāt must inspire students of architecture and planning to examine old issues in the light of the new Najdi context, to assess all traditional materials, to re-examine past studies in other countries, to formulate new questions, and so open up new areas of research. These would include the following:

Opposite The bench or mastabah on the northern side of the courtyard.

Clockwise from top left

- The mosque with its simple *mihrāb* on the right.
- The sitting-room on the north side of the courtyard.
- A fire blazes on the hearth in the sitting-room on the north side.





- *Left: The wijār in the dīwāniyyah.*
- *Bellow: A sitting-room, with juṣṣ carving on wall.*









- Enhanced durability of the natural earth mix without reducing its permeability.
- Earth stabilizers such as cement and bitumen, and chemical additives.
- Enhanced resistance of adobe to termite attack.
- Water-resistant coatings and wall cappings.
- Building environment and micro-climate studies.
- Locally available building material studies: sandstone, limestone, gypsum, tamarisk wood, etc.
- Development of local building skills.
- Building regulations for adobe buildings,
- Types of community and social organization which are needed if adobe buildings are to be maintained in the long term.

Beyond al-‘Udhaibāt

With studies such as these and a new generation of architects, it may well be that we shall see the emergence of a new type of architecture in Saudi Arabia which combines the best of the old with the best of new low level technology. A movement such as this would mirror the revived interest being shown in adobe worldwide, especially that in the south-western United States. Because of the low cost of materials, new adobe courtyard houses will be able to be spacious, graceful and familiar, and custom-made for each family. Modern impervious materials will find their way into “wet” areas – bathrooms and kitchens - and modern plumbing and drainage will be used. Adobe houses will be “wired up”, as al-‘Udhaibāt Farm already is, for the latest media and telecommunications links. With their natural thermal and aerodynamic virtues they will be cheap to run. But it is probably true that no passive house can cope unaided with the torrid Arabian summer, and so this

may have to be solved in modern ways, for example by the possible development of solar-powered air-conditioning during the four hot months, with the same system providing hot water throughout the year.

At the very least, the new architects must shake off the prejudice which leads us to ignore traditional materials just because they do not seem “modern”. Here Arizona and New Mexico have important lessons to teach, for a great deal of experimentation with new adobe forms has been going on there since the 1970s (though it has to be said that even here the official building regulations are still insisting on the use of a cement render coating, which is not only unnecessary but, by preventing the wall from breathing and drying out once wet, actually damaging). If anything, Prince Sulṭān’s instinct in staying with natural ingredients for the mud mix was probably, in the current state of knowledge, correct.

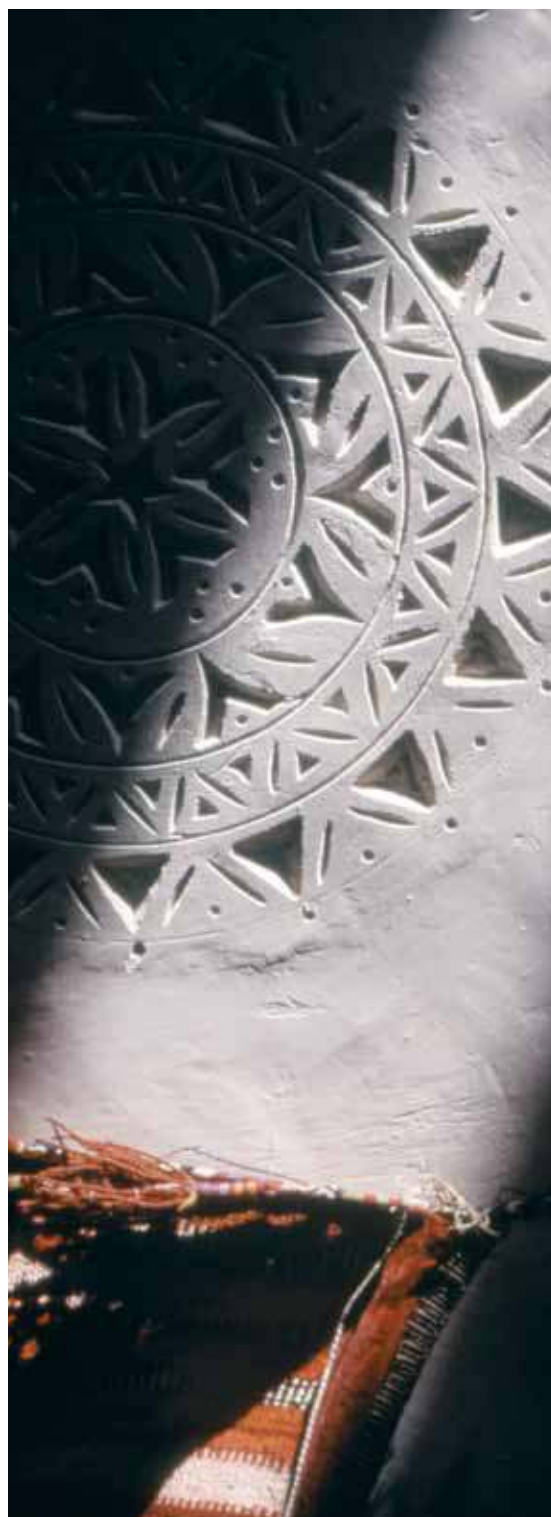
The future of this new school of Najdi building will lie in its environmental friendliness, using local, possibly low-cost materials combined with green technologies such as solar power. For Prince Sulṭān, al-‘Udhaibāt is nothing unless its message is carried on by further work. As far as the farm as a whole is concerned, permission has already been given for it to be used as part of a programme, being set up by King Sa‘ūd University, to introduce and encourage the use of local flora and fauna. But it is young architectural students who are central to his vision because it is on them, and the scientific studies which they can carry out, that the future of adobe architecture in Saudi Arabia depends. As Fathy remarked, “An architect is in a unique position to revive the peasant’s faith in his own culture. If, as an authoritative critic, he shows what is admirable in local forms, and even goes so far as to use



Left A newly painted door design.

Opposite A door opening onto the courtyard.

On p. 218-219 The great well seen from one of the gates.



Right A shaft of sunlight catches a gypsum roundel.

Opposite The north (back) door showing its lock and key.

Over page General view of the great well and the pool in al-'Udhaibāt

them himself, then the peasants at once begin to look on their own products with pride.” (Hasan Fathy *Architecture for the Poor* p.43).

Fathy’s writings combine humour and realism tinged with resignation, and he also delivered the following timeless caution against over-optimism; “...young architects... must not suppose that once they know all about materials and structures, once they are fired with a love of beautiful building and a determination to bring beauty into the lives of their fellow men, they are then equipped to go out and build. When an architect feels a sense of mission, he will inevitably experience a great deal of resistance to his purpose.” (*Architecture for the Poor* p.185).

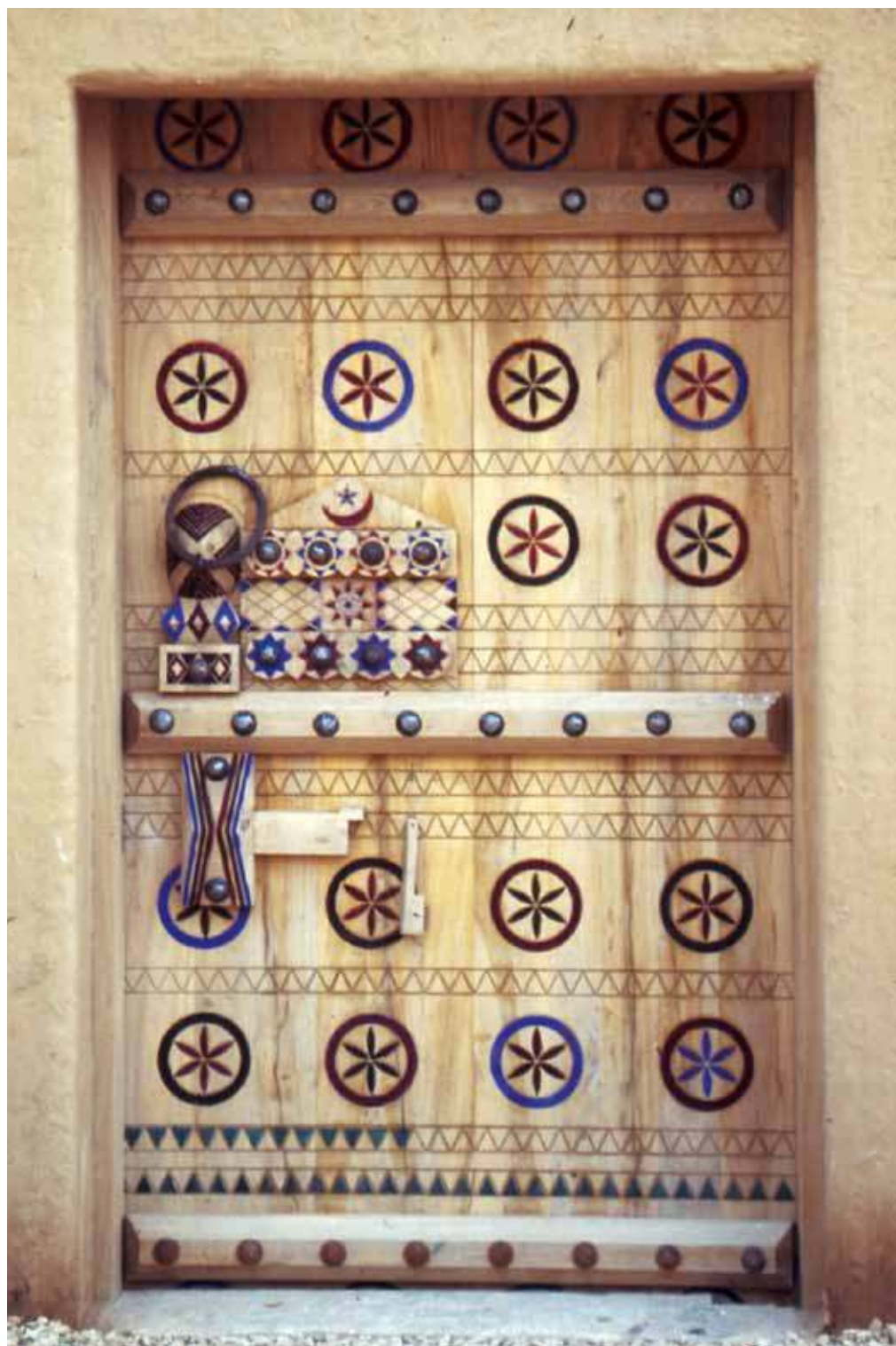
Movements for change require not just hopeful visionaries, but also influential patrons and eloquent promotion. In reopening the debate in Saudi Arabia about mud architecture, Prince Sulṭān is leading by example and by lending his voice to the promotion of idea. He now envisages the creation of a research village where studies can be conducted, for students of architecture to live and work in. It is appropriate that the village of his choice – Bujairī, facing the ruins of Atturaif across Wadi Ḥanīfah – is an unusual one that has witnessed the teaching of an earlier message that is still essential to an understanding of Saudi Arabia today. For it was at Bujairī that the 18th century Islamic reformer Shaikh Muḥammad bin ‘Abd al-Wahhāb settled, and where he taught during the heyday of ad-Dir‘iyyah.

Informing the new school of Najdi building will be the sense that we cannot survive in reasonable conditions unless we take responsibility for our environment. Those who have seen the Earth from space tend to have a heightened awareness of the fragility of

the biosphere which supports us, and whose destruction will destroy us. Man's recent acquisition of the capacity, through technology and population growth, to inflict large-scale damage on the global environment, confers on him a special responsibility to use that power wisely.

For Muslims especially this is a natural lesson to learn, for the Qur'an teaches that, while man may make use of nature for his own benefit, he also has a duty to care for it and to nurture it. This concept of stewardship extends beyond that of enlightened self-interest to include the notion of man as trustee, with the responsibility to ensure that nature is truly regarded as part of God's creation, and that it is not impoverished for future generations. There is an emphasis on balance-*mīzān*-when making use of what God has created. The concept of *mīzān*, applied to our modern world, translates remarkably well as sustainability.

Today Saudis are rethinking their attitude to their past. There is a new pride which marks a relatively recent shift in their attitude towards their roots. During the early boom years of the 1970s the uneasy tension between the urgent need to modernize and the claims of the architectural past to be preserved was brutally resolved in favour of the new. Much that was perceived to be too much a reminder of the old, simple ways was swept away. Now the emphasis has changed: enough has vanished to give what remains a rarity value, and a new generation has grown up which feels a responsibility for the long-term future, and wants to know more about the old days, in order to recover and preserve what was of lasting value. There can be no doubt that al-'Udhaibāt Farm will exercise a profound influence in this process.







Glossary

Some traditional Najdi building terms

With thanks to Architect Sami al-Jubair.

- ‘āīr* Corner of the house.

athl Tamarisk, tamarisk wood.

bāb Door.

bait, pl. *buyūt* House

bait abū sāriyyah Literally “house of a father of a column”, a room with a single column supporting the ceiling. The name distinguishes it from all other rooms in the house.

bait al-daraj A storage area located under the stairs.

bāqdīr The traditional air vent which directs air from the roof into the house. The word is of Persian origin.

baīn al-bait The “stomach” or middle of the house, often referring to the courtyard.

baīn al-ḥawi The same as *baīn al-bait*.

dahrīz A corridor, hallway; the space connecting the outside door with the courtyard.

dār, pl. *diyār* House.

darajah A step of a stair; the stairs as a whole. Also *zīlfah*.

darīshah A window.

darwah See *ḥajā*.

dīwāniyyah Reception room, sitting-room. The public room of the house in which guests are received, normally situated on one side of the *dahrīz*. Often magnificently decorated with carved gypsum plasterwork.

dūzanah Shelf or alcove built into the wall. Same as *fāghrah*.

fāghrah See *dūzanah*.
- farāsh* Literally “bed”; a bed of mud spread beneath the mud bricks.

farjah Shelf; small aperture in the wall.

fatāsh See *kashshāf*.

fātūlah Peep-hole. Same as *ṭarmah*.

ghurfat umm sāriyyah Literally “room of a mother of a column”. A single-columned room; a spacious squarish room with single central column supporting the roof beams. Same as *bait abū sāriyyah*.

ḥajā Parapet wall round the roof. Also *darwah*, *sitrah*.

‘isbān Palm tree branches.

jamāmīl Stone-cutters, stone-masons.

jamjamah The fixed part of the main door lock, in which the moving part of the lock is located.

jarīd Date palm branches after the removal of the leaves; palm leaf spines.

juṣṣ Gypsum, gypsum plaster.

kamār Cupboard; a multi-shelf cupboard without doors in the *dīwāniyyah*, used for storing the utensils for making tea and coffee. The alcove is built of *juṣṣ* (gypsum plaster), and the shelves may be built of either wood or *juṣṣ*. The *kamār* is highly decorated with incised motifs.

kamr Same as *kamār*.

kashshāf An opening in the ceiling for venting smoke from fires in the kitchen or sitting-room. The *kashshāf* has a cover which is controlled by a cord passing over a small wheel to ease its operation. The end of the cord is within reach of the person in the kitchen or sitting-room. Also known as *fatāsh*.

- kharaz* Stone cylinder; drum-shaped pieces of stone, maximum height usually 30cm, used for building columns.
- khaṭaf* A diagonal plank nailed to the back of the door, giving it extra support and rigidity.
- khūs* Date palm leaves.
- kuwah* A hole in the door; an opening in the outside door to insert the hand in order to unlock the door from the inside with the wooden key.
- labin* Adobes; sun-dried mud bricks, Dimensions are decided by the master-builder (*ustādh binā'*), and generally vary from 30 x 15cm up to 40 x 20cm, with a thickness of 10-15cm
- majbab* Roofed way. Also used for the entrance to the house, or *dahrīz*.
- mijra* The moving part of the door lock, inside the *jamjamah*; used on the outside doors.
- malāṭ* See *mash*
- malban* Wooden brick mould for making adobes or mud bricks. Made of wood fastened with rope or leather thongs.
- maqdamah* An engaged column; a column of stone drums mortared with gypsum built into the wall to give extra support to the roof structure (*saqīf*). Needed when the roof is large.
- mash* Smoothing, giving a smooth finish. Same as *mashāsh*, *malāt*, *talayyis*. Wall decoration is carried out after this stage.
- mashāsh* See *mash*.
- maṣṭabah* Bench of mud or masonry at base of wall, usually within or adjacent to an entrance.
- maṭā'in* Place where earth for building (*fīn*) is found.
- mawqad* Kitchen; literally "fireplace"
- mirzam*, pl. *marāzīm* Roof-drain: like *mith'ab* but made of sheet-iron. A *mirzam* is in pipe form with a diameter of 7-8 cm, and protrudes up to 75cm from the wall.
- mishab* Fireplace in the *dīwāniyyah* where coffee and tea are made.
- mīzāb* Roof-drain; a gutter made of tamarisk wood protruding from the base of the parapet wall to throw rainwater clear of the exterior wall surface. Its end can be either straight or curved to one side, in order to avoid splashing water onto neighbours' walls. See also *mirzam*.
- muqawas* Curved wall texturing made with the flat of the hand, and done in horizontal registers on external walls. The term is derived from the action of making an arc with the arm outstretched. It is carried out immediately after the final smoothing of the mud plaster (*mash*).
- muṣābīḥ* Literally "corridors"; the shaded colonnade providing a transition from the enclosed rooms to the open courtyard. All room doors open out into it, and it is used as a shaded living area. See also *ruwāq*.
- naqsh* Incised decoration on gypsum or wood.
- qahwah* Coffee; room where coffee is prepared and served. Reception room for guests, sitting-room. Same as *dīwāniyyah*.
- qanā'ah* Stone bearer; a stone slab inserted into the top of the wall, supporting the beam-end at the level of the ceiling structure (*saqīf*)
- qanāyā* Column capitals; rectangular stone slabs cut to make up column capitals. Each capital consists of three slabs each of the same width and thickness but of different lengths, placed one on another in order of increasing size. The capitals serve to reduce the distance to be spanned by beams between columns.
- qaṣah bāb* Door knocker
- rādah* A blocking wall; an inside wall facing the outside door, preventing people from seeing inside the house and courtyard.
- ruṣṣah*, pl. *ruṣṣāt* A course of brickwork. Also *sūqah*.
- ruwāq*, pl. *arwiqah* An internal arcade or

gallery surrounding the courtyard of the house.
Also known as *muṣābīḥ*.

ṣāṭir Door-jamb; the main bearer of tamarisk wood in the door, on which it turns. It is set into a stone hole or socket at the base, and a wooden socket in the lintel.

sakrah Moving part of the smaller door-locks on the room doors.

saqīf, pl. *sawāqīf* House roof; more specially the wooden structure of beams and rafters which bear the roof layers of branches, leaves, rubble and earth.

sāriyyah, pl. *sawārī* A column, built of stone drums plastered with gypsum or mud.

sha‘īr Barley, barley straw.

sitrah See *ḥajā*.

ṣūb‘ah Literally “fingering”; roughening of the wall after *tashbī‘* ‘to provide “key” for the smooth plaster coat.

sūqah See *ruṣah*.

ta‘bīb Digging foundations.

ṭāiyyah Roof.

takhmīr al-ṭīn Maturing, proving, “fermentation” of the mixed mud, straw and water.

talayyis See *mash*.

ṭarmah Vertical peephole or machicolation: a protruding contraption above the main house door, enabling residents to discreetly inspect callers.

tashbī‘ Filling or pointing the spaces between the mud bricks with mud and straw mortar. This is followed by *ṣūb‘ah*, after which *malāṭ* or smoothing takes place.

tawlīf Lit. “fitting”; joinery; more specifically cutting beams and rafters to size for different rooms and fixing them accordingly.

tibn Straw, dried wheat or barley stalks.

ṭīn Mud; the clay and earth mixed with water,

to which chopped straw is added to make mud mortar, plaster and adobes.

al-ṭīn al-mutaban Mud mixed with straw.

al-ṭūb Brick; mud brick.

turāb Soil, earth, silt. Mixed with *tin* which is too clayey for building purposes.

ustādh binā‘ Master-builder; chief bricklayer.

He is a master craftsman who consults with the owner in deciding the plan, size and facilities of the house, masterminds the building program, supervises all the workers on site, and takes part in the work himself.

ustādh juṣṣ Head craftsman in gypsum. He carries out the decorative schemes in gypsum plaster, and is responsible for all the gypsum plasterwork on site.

wijān Door frame. The architraves are built of stone and gypsum mortar, or else of mud bricks and gypsum mortar, to give extra strength needed to support the door hinges. *Wijans* are also sometimes built into the corners of large rooms for extra structural strength.

wijār Fireplace in the *dīwāniyyah* where coffee and tea are made. With the *wijār is* found the *kamār* or cupboard. A bellows or air-generating fan can be installed at one corner of the *wijār*, with a pipe leading the air to the seat of the fire.

zīlfah, pl. *zalaḥ* See *darajah*.

Note on transliteration

Arabic words and names have been transliterated into English following a full scholarly system. We have put aside the fear that this may be regarded as off-putting for the general reader who is unfamiliar with the Arabic script. The mystery of the Arabic script has been much exaggerated in the English speaking world, and consequent efforts to simplify transliteration have merely added to the confusion by creating inconsistency. It is important that Arab readers, and non-Arab readers who are familiar with Arabic, should feel that they can transcribe names correctly into Arabic on the basis of the transliteration provided here.

The system used in this book is that laid down in the journal *New Arabian Studies*, and so includes diacritical dots and long vowel indicators, as follows.

ا	ā	ف	f
ب	b	ق	q
ت	t	ك	k
ث	th	ل	l
ج	j	م	m
ح	h	ن	n
خ	kh	ه	h
د	d	و	w,ū when used as a long vowel, uww when doubled, e.g. in-uwwah.
ذ	dh		
ر	r	ي	y,ī when used as a long vowel, iyy when doubled e.g. in-iyyah.
ز	z		
س	s		
ش	sh	ض	ḍ
ص	ṣ	ط	ṭ
ظ	ẓ	ى	ā
ع	‘	ء	’
غ	gh	Notes	

1. Alif, when used as a “seat” for hamzah, is transliterated with the original vowel of the *hamzah*, e.g. *ism*, *Islam*.
2. *Hamzah* is written as single closed apostrophe, ' , when medial or final; and not transliterated when initial. E.g. *su'āl*, *nisā'*, but *ism*.
3. *Tā' marbutah* is written –ah, e.g. *rahmal*; but –at in *idāfah* constructions, e.g. *rahmat allah*.
4. Short vowels (*fathah*, *kasrah*, *ḍammah*): a, i, u.
5. Long vowels: ā, ī, ū.
6. Diphthongs: aw, ay (or ai).
7. A doubled consonant, indicated by a *shaddah* in Arabic, is represented in English by a double consonant, i.e.; □□□□ = -tt-.
8. The definite article is always shown, and is always *al-*, even with sun letters, e.g. *Al-salām* not *as-salām*.
9. The definite article should never be confused with the word *Āl* in front of a personal name, with capital A and without a hyphen, which denotes “family of”, “clan of” or “House of” e.g. *Āl Sa'ūd*, “the House of Sa'ūd”.
10. Some proper names are familiar to the English reader in a certain form, for example Sa'ūd, 'Abdullah, Riyadh, Dhahran, Wadi. Even though these transliterations are strictly incorrect, they are hallowed by convention and are left in that guise. There are grey areas here, of course, but all local names which are not widely known have been fully transliterated.

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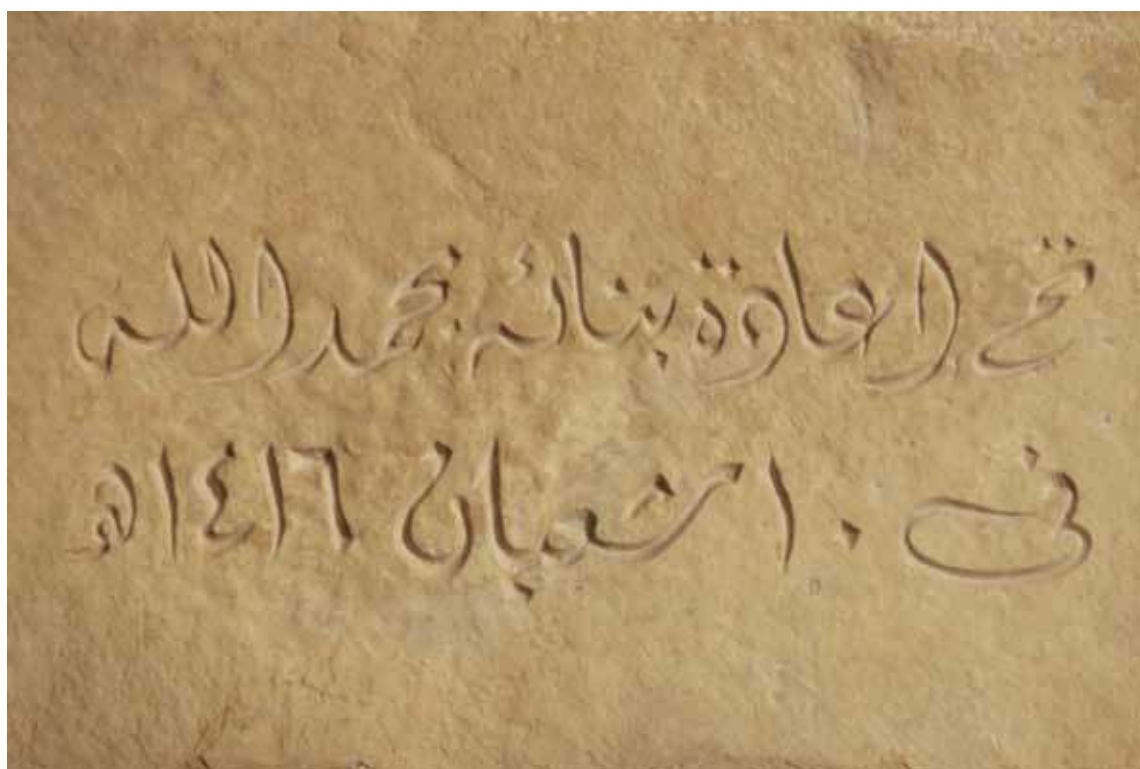
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Above An inscription in local stone just inside the main gate records completion of the house (1996).

